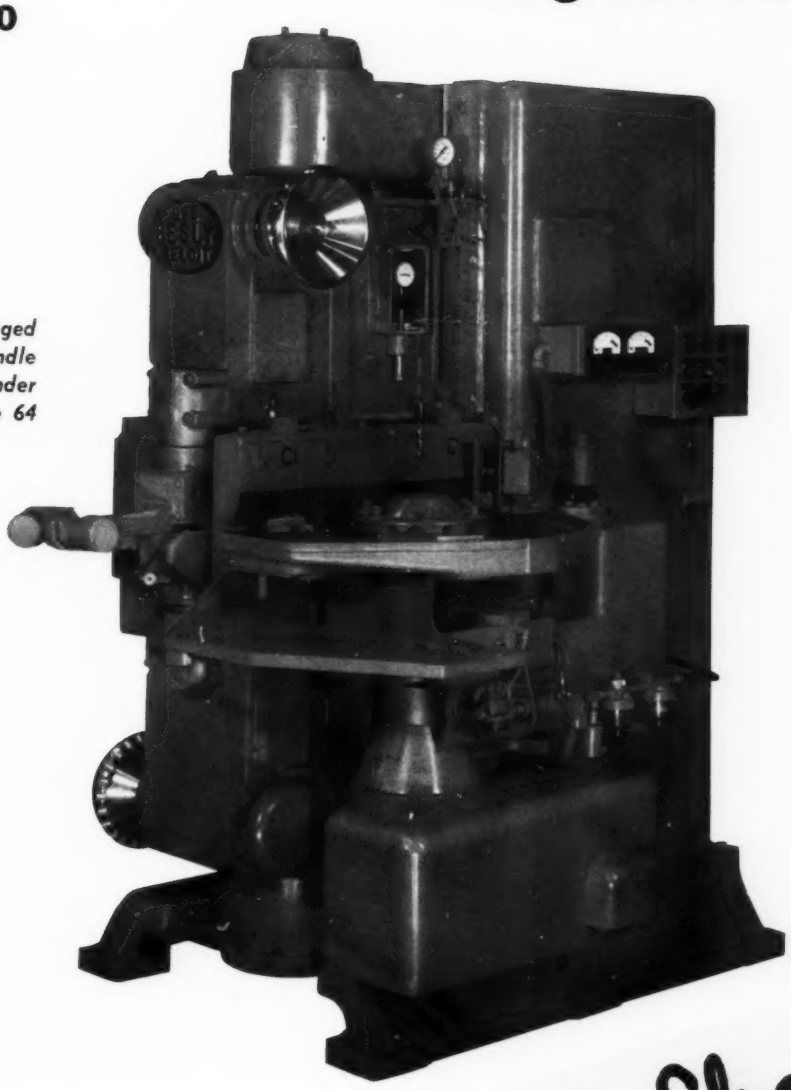
TOOLING & PRODUCTION

Magazine

APRIL 1960



ple, Accurate, Rugged
—New Double-Spindle
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Tool Show Issue!!

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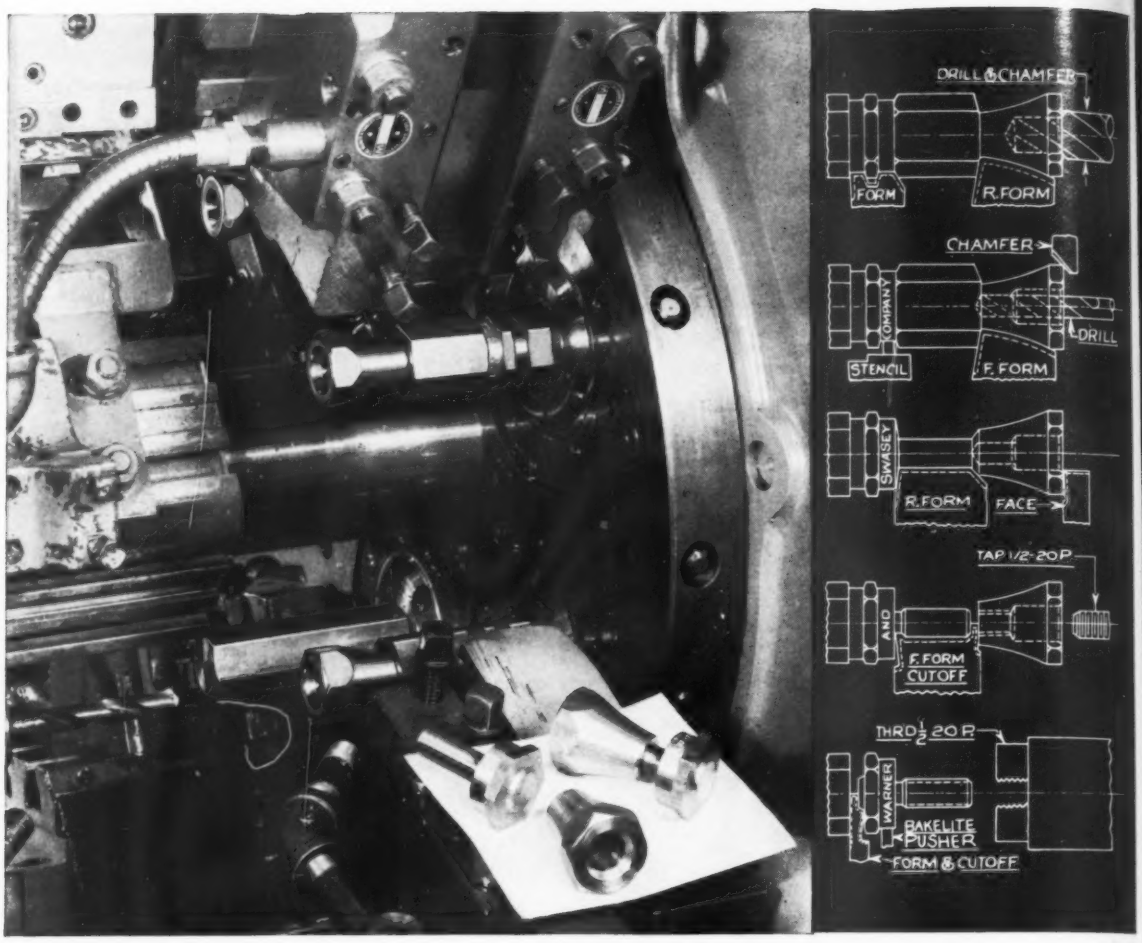

Warner & Swasey 5-Spindle Automatic produces complex 2-piece job in one cycle!

THIS JOB demonstrates the versatility of the Warner & Swasey 5-Spindle Bar Automatic in producing complex jobs that also require heavy metal removal ability.

This machine can produce both parts of this jack screw almost simultaneously. After taking the form cuts, one piece is tapped and cut off in the fourth position, and the second threaded and cut off in the fifth position. The entire operation — 43.4 seconds!

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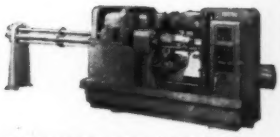
Camless design of the 5-Spindle Automatic provides quick changes of all strokes, and feeds and speeds. Strokes are quickly set with the patented quadrant control mechanism, using simple linear scales. Speeds are changed by quick change gears and feeds by shifting sliding gears in the feed box.

On complex jobs like this, and many simpler ones, the quick setup of Warner & Swasey Multi-Spindle Automatics will pay off for you—even on medium and small lot work. To find out more about the adaptability of these machines to your own work, call in your Warner & Swasey Field Representative.



5-SPINDLE BAR MACHINE
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6-SPINDLE BAR MACHINE
1¼" Bar Capacity

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CIRCLE INFORM-A-GRAM KEY NO. 2

TOOLING & PRODUCTION Magazine

VOL. XXVI, No. 1

APRIL 1960

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Form 3579 requested. Send to Editorial and Business Offices: 1975 Lee Road, Cleveland 18, Ohio. Accepted as a Controlled Circulation Publication at Shepherdsville, Ky. Single copies, $1.00 each. U. S. subscription rate $2.00, per year for metalworking plant operating executives and department heads. All other subscriptions, $6.50 per year. Foreign subscriptions, $10.00 per year.

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BPA

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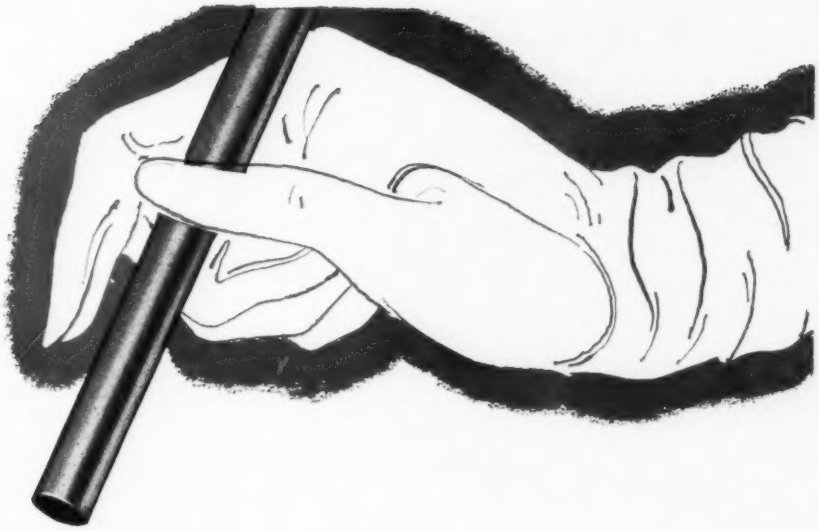

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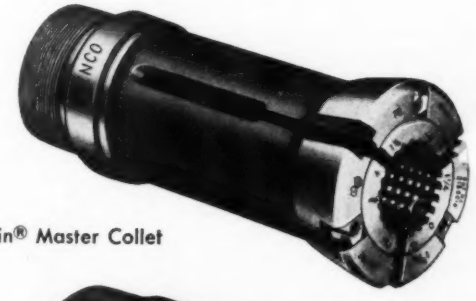

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CIRCLE INFORM-A-GRAM KEY NO. 4

APRIL 1960
VOL. XXVI No. 1
GEORGE J. HUEBNER, Founder
1885 - 1956

personally speaking ...

Dear T & P Reader:

Like many other businesses, the publishers of business papers (including the one you are now reading) have an association. Its primary purpose is to improve continually the value of business papers to readers, to advertisers and thus, indirectly, to the public as a whole. It is my privilege to be attending, at the moment, the annual meeting of National Business Publications, our association.

Most of what goes on at an NBP meeting is not of direct concern or interest to business paper readers, but one presentation made at this meeting is of great import to all businessmen. For that matter, it is of interest to almost everyone. I'm referring to a talk, "The Fifth Freedom—To Advertise," given by Congressman Hale Boggs of Louisiana, a member of the House Ways and Means Committee. Congressman Boggs was elected to the House of Representatives in 1940 and has been a member of the House since then except for a three year military service interruption.

Congressman Boggs discussed the purposes behind a bill he has authored. Existing laws permit the Internal Revenue Service to dis-allow charging as expense any expenditures by business for the influencing of legislation. Similarly, labor unions are prohibited by law from spending union funds for supporting or opposing legislation. This often seriously curtails information available to the Congress. Our lawmakers in Washington, in our State Capitols, and in our local communities, need information to aid them in making decisions. They can't be experts on everything. As I understand it, Congressman Boggs' bill would permit you to charge, as a business expense, costs you might incur in informing our lawmakers concerning the good or bad features of any proposed legislation.

In other words, you or your company or your union would be allowed to do whatever would be necessary to communicate your knowledge to our lawmakers. This might take the form of advertising since advertising is a most important way of communicating thoughts and ideas and information. Hence, Congressman Boggs' subject, "The Fifth Freedom — To Advertise."

The speech was especially convincing when it was pointed out that expenses incurred in appearing in court or before some government department, for almost any purpose except legislation, are fully deductible. So, why not those expenses in providing information to aid in evaluation of legislation? Congressman Boggs' bill is HR7123. A copy of this bill can be had quite readily. If you want us to get one for you, drop me a line. If you favor this bill, the sponsor of it will be glad to hear from you and will welcome your support.

Cordially yours,

Ray Huebner

Publisher

V-R Ceramic VR-97

Ceramic VR-97 Turning SAE 5060 Steel Tubing at 1320 SFPM, Ford Motor Co. Automatic Transmission Plant

Proven in production at Ford Motor Company

Ceramic VR-97 is a proven performer in many machining operations at the Ford Motor Company's Automatic Transmission Plant, Livonia, Michigan. Here, and in hundreds of other progressive plants across the nation, VR-97 has been proving its value on continuous production runs. People who considered ceramic tooling as merely "experimental" a short time ago now rely on ceramic VR-97 as an important part of their production picture.

Whether you are interested in increased machine output, higher speeds, better finish or machining hardened steel and cast iron, it will pay you to know more about ceramic VR-97. Contact your nearest V-R representative or write for complete information.

Ask for Product Information BULLETIN NO. 59.1 covering Ceramic VR-97.

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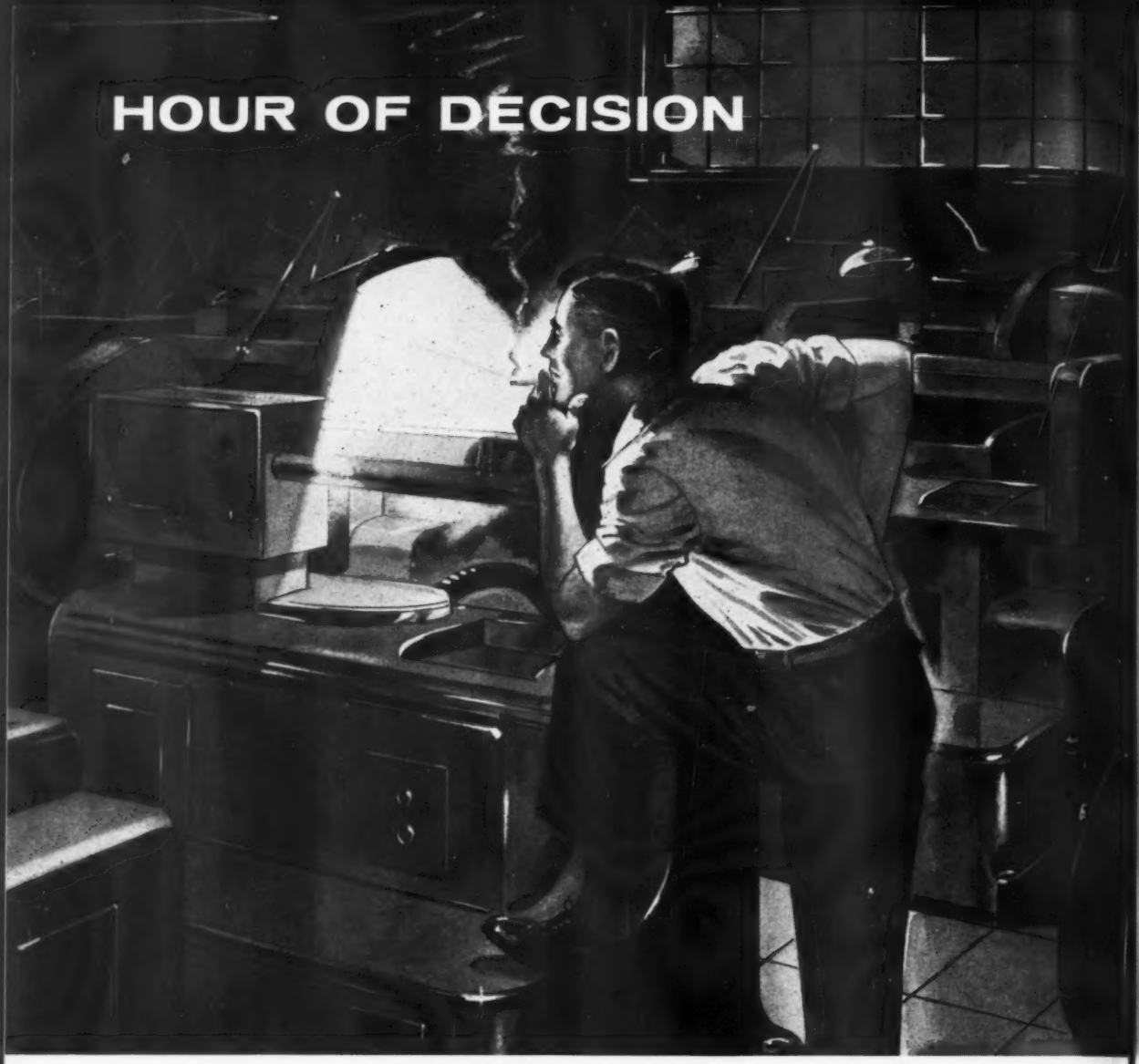
HOUR OF DECISION



IS THIS YOU? How many times, after the call bell stops clanging, the customers stop phoning, and people stop asking questions, do you walk into the quiet shop to face up to the really vital decisions?

"How can we compensate for the rising costs of materials, overhead, payroll, maintenance?" "How can we keep producing the exacting tolerances, finishes, and quality our markets are demanding?" "How can we improve our production efficiency so that our narrow profit margin will not disappear altogether?" "How can we meet and beat the increasing world-wide competition in our field?"

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Also see the PRODUCTION ENGINEERING SHOW on the Navy Pier. One registration covers both.

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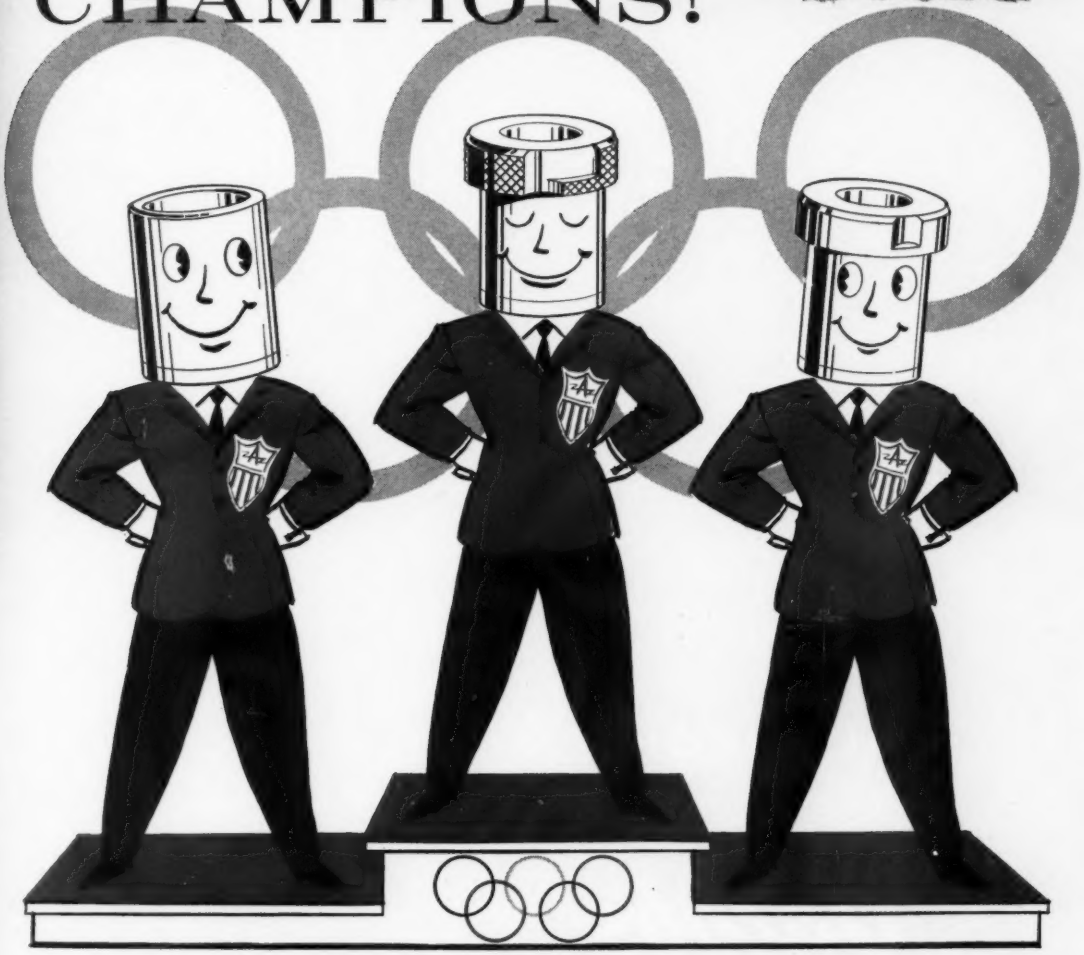

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CIRCLE INFORM-A-GRAM KEY NO. 8

An Editor Talks to Management

Maintenance Makes Money

by William E. Hoffman
Engineering Editor

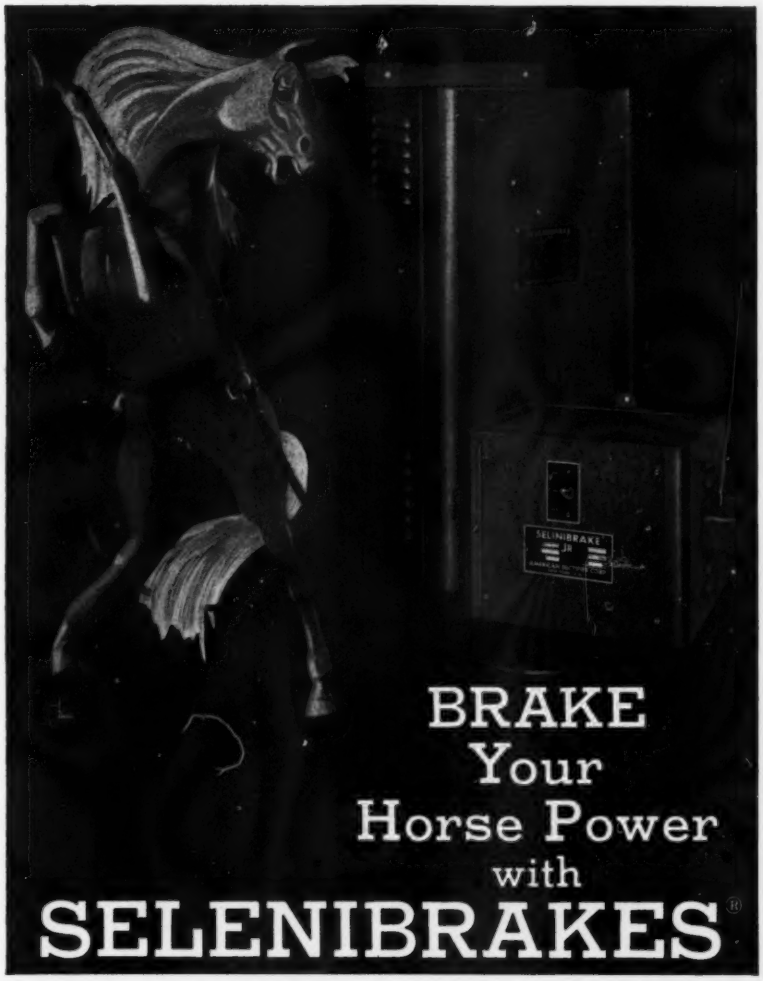
CERTAINLY THERE ARE times when a machine component failure will shut down a unit. Metal flaws or fatigue are nearly impossible to predict. However, **except** for these unforseeable failures, it's no more than reasonable to expect production to progress without downtime. If a machine-burden is worth setting up in your budget, it's certainly worth proper maintenance to help the machine live up to its responsibility.

This article is excerpted from Bill Hoffman's talk at the recent Maintenance Engineering Conference of the Drop Forging Association, Cleveland. It set the stage for the more thoroughly forging maintenance talks that followed, and should be of value to the management of all industries.

One mighty expensive way to approach maintenance engineering is to wait for the continuous breakdown before correcting offending peculiarities. If you're not careful, the frequent-offender-units may command all your attention, and the sometimes-offender will continue to pull at the stockholders' purse for a slow but sure emptying. Probably the real reason for this is that few plants, even the big ones, have enough men allocated to this effort.

There are many that still look upon a good maintenance program as one of the necessary evils of

... Continued on page 13



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AUTOMATIC

This automotive pinion is fed automatically from a vibratory feeder down a chute to the magazine slide from which it is located and clamped on an expanding arbor. The pinion is cut, stripped from the arbor and ejected into the unloading chute. Total elapsed time, one minute. *Gear Data:* 16 Teeth, 18 Pitch, 20° Pressure Angle, 18° 30′ Helix Angle, 5/8″ Face Width.

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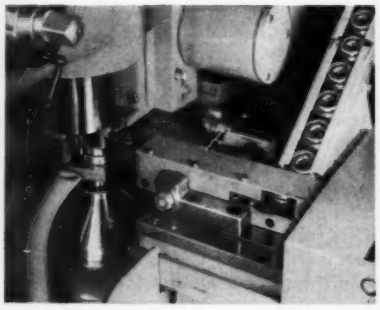
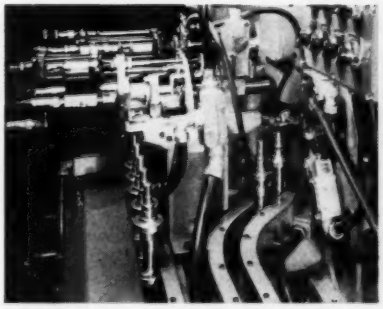
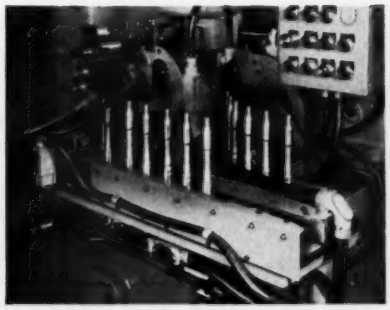


These internal clutch parts are handled in the same manner as the 16-tooth external pinion, except that the cutter-spindle is automatically stopped at the top of its stroke for clearance during the loading and unloading cycle. Cutting time is 1½ minutes. *Gear Data:* 10 Teeth, 12.4 Pitch (Stubbed), 30° Pressure Angle, Spur, 5/32″ Face Width.



This transmission cluster gear shaft is handled by two sets of air-operated "fingers" mounted on a turret. As the turret rotates, one set of fingers moves the finished piece to the unloading chute while the other set brings the new blank into position. Cutting time is 35 seconds. *Gear Data:* 10 Teeth, 12.4 Pitch (Stubbed), 30° Pressure Angle, External Spur, 5/32″ Face Width.



This automotive stem pinion is handled in the same manner as the cluster gear. In both cases, safety devices prevent the machine from starting unless the blanks are in the correct cutting position. Loading and unloading chutes may be hand or conveyor fed. Cutting time is 2½ minutes. *Gear Data:* 17 Teeth, 10 Pitch, 19° 30′ Pressure Angle, 32° 51′ Helix Angle, 5/8″ Face Width.

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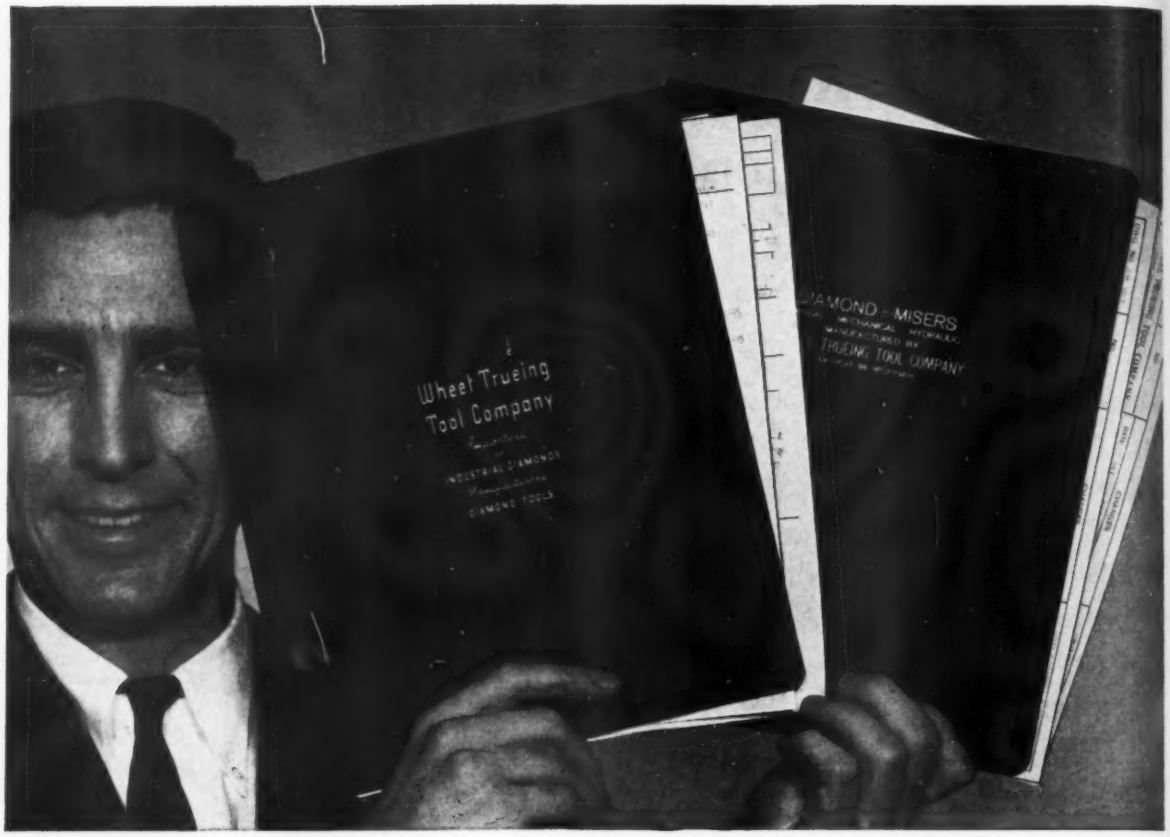

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And, you can save plenty, too! Even in a plant where everybody right down the line has a proper respect for diamonds and handles diamond tools with almost loving care, there are often surprising savings to be made when you get together with the diamond engineer.

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Our diamond engineers have been doing this for 50 years—much longer than anybody else; in fact, these men originated the diamond tool "engineered to its job—and guaranteed to do it." And, the companies who use this service regularly to their profit are among the most successful in their fields.

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CIRCLE INFORM-A-GRAM KEY NO. 12

. . . Month's Talk from page 9

manufacturing. It's like the tool design profession at the turn of the century, and even later.

Tool designers then were not a separate entity. Companies which had draftsmen called them all Jack. Jack did plant layout, product design, machine design, tool design—whatever came along. He had the help of everyone who passed his board, and what couldn't be doped out was left for the people out in the shop. The latter set the stage for our tool making profession; the former, the specialists called tool designers.

Today we see unmistakable signs of maintenance procedures becoming specialized, too. Many plants have full time people on the semi-executive level for this pursuit. But, there are many that don't. When it becomes the rule rather than the exception, our nationwide maintenance picture will be approaching its optimum.

Ways to Improve

Among others, here are three approaches to maintenance practice improvement:

1. Provide an incentive system for maintenance people (and machine operators, too) whereby they can make more money for their help in keeping equipment running.

2. Build-in safety features to help machines protect themselves. For example, relief valves on hydraulic systems that are continually being over-loaded.

3. Put on a full-time or part-time shop-sleuth. Someone with ability, who's allowed time to watch for and wait out repetitive causes of breakdowns.

It's been my experience that the type of people directly charged with doing the actual work are usually without much formal education. They are capable of carrying out their duties, and well, but not capable of rising above this to oversee a program. Depending on their ages, they may have faced up to this fact, so they must find satisfaction in doing repetitive work. They are people who live modestly well. They have a small home with a clean neat garage and a well cared for yard. One fellow I know even had his basement pipes painted. So, in the morning they leave this "well maintained" little place to go to a big disorderly one. They're defeated before they start.

Disorder doesn't have to be visible. More than likely it isn't.

After all, a machine can be clean and sit in clean, orderly aisles and yet connote an awful headache to those who know there are repairs needed inside.

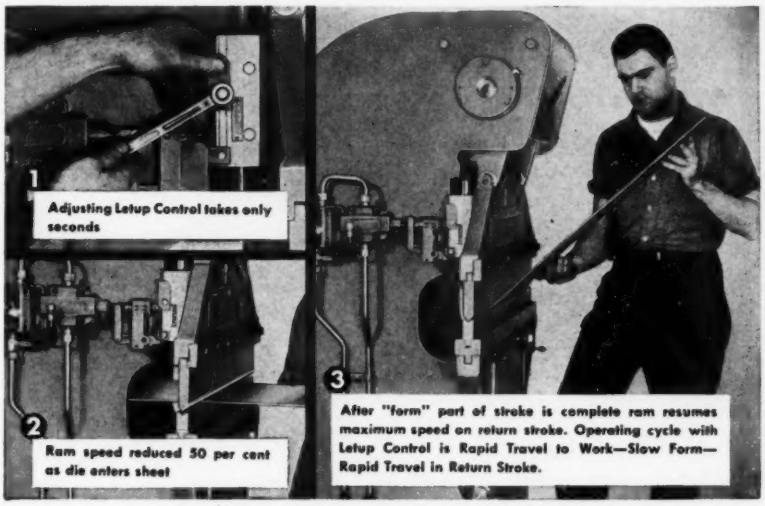
The repair-order-rack may look neat, but it may certainly defeat the small handful of people expected somehow to put a dent in it.

Everyone knows the value of preventive maintenance but most are too far behind in their regular work to put forth the effort or even approach their repair work with the proper respect.

As I said before, most people like order, but if the possibilities for this are overwhelmingly impossible you can't expect constructive help from those snowed-in by these circumstances.

A plan whereby management and shop personnel can respect

. . . Continued on page 14


1
Adjusting Letup Control takes only seconds
2
Ram speed reduced 50 per cent as die enters sheet
3
After "form" part of stroke is complete ram resumes maximum speed on return stroke. Operating cycle with Letup Control is Rapid Travel to Work—Slow Form—Rapid Travel in Return Stroke.

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The 12 ton series of Di-Acro Hydra-Power Press Brakes are available in 3, 4, 6 ft. models. A 25 ton series is also available in 6 and 8 ft. bed lengths. All Di-Acro Press Brakes feature Stroke Adjustment that enables faster and safer forming and punching of sheet material—even by women and inexperienced operators.

Heard about the new Di-Acro Rol-Form Dies? They eliminate work marking of material, reduce number of die setups and cut changeover time in press brake operations. Also available for punch presses.

Write for literature, prices and delivery. See Di-Acro Machines in operation Booth 805 ASTE Show, April 21-28 in Detroit

di-acro PRECISION METALWORKING MACHINES

pronounced die-ack-ro

O'NEIL-IRWIN MFG. CO.

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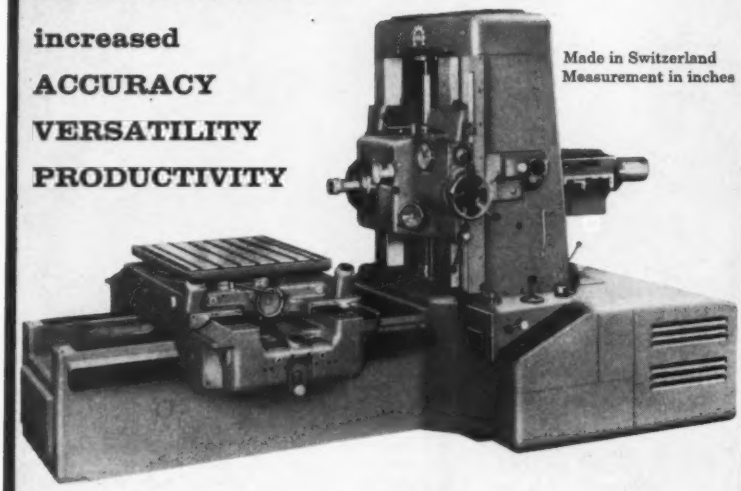
CIRCLE INFORM-A-GRAM KEY NO. 13

CUT ACCUMULATED ERRORS to a minimum

with the

DIXI 75 horizontal optical jig borer

increased
ACCURACY
VERSATILITY
PRODUCTIVITY



Made in Switzerland
Measurement in inches

- Automatic positioning can be changed instantly to manual operation
- Projected optical setting—direct reading to .00005" for linear motions and 1 sec. of arc for built-in rotary table. Linear optics provided with adjustable zero reference
- Simplified controls functionally arranged for greater operating speed and efficiency
- 3" diameter boring spindle
- Increased capacity: table size 39⅜" x 32"; 29⅝" cross travel; 23⅝" longitudinal travel; 25⅝" vertical travel
- Hydraulic feeds and infinitely variable spindle speeds
- Rear support optional

See the DIXI 75 in operation at the
ASTE SHOW, Booth 1505, April 21-28
Write for your admission cards to:

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A DIVISION OF MACHINERY BUILDERS, INC.
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Swiss Accuracy plus U. S. Know-how

CIRCLE INFORM-A-GRAM KEY NO. 14

. . . Month's Talk from page 13

each other, for mutual benefit, is necessary. If management will be satisfied with a percent decrease in cost the maintenance department will have something to shoot for. As a plan of this nature would mature, management could look forward to regular cost decreases. It would be worth their consideration to allow maintenance to be what might appear overstaffed, in order that all equipment, within reason, could be put in tiptop shape. Then maintenance could be cut back after a reasonable ratio of men to expenditure was established.

The foreman has the problem of carrying out a program. But, it must be in effect for a time before he can get comparative figures to work with. He will want to work toward setting up criterion to which the department can work. Without a record, or some goal, work can be pretty thankless. Those doing the work derive no satisfaction and management never knows where they stand.

Hard to Predict Costs

Seldom does a maintenance program get started with all new equipment. Even when a new plant goes up, it's often equipped with some used machinery. So, it's difficult to predict maintenance costs, and more difficult to get all equipment running in top condition at the same time. Even though seldom possible, it's theoretically necessary for maintenance reports to reflect a true cost-picture.

Maintenance people are discouraged in other ways too, and I don't think we need to discuss the effect a "poor attitude" can have on any program. We are built to demand satisfaction and must be able to see an end to our work. Not that it's necessary that we ever get completely through, but certainly an overwhelming backlog defeats its purpose—and those doing the work.

I have seen management aware of a need for a definite PM program, and they delegate authority for its being established to the best man available. But, the best man available may not be capable. He may need training other than just

. . . Continued on page 16

Be SURE TO VISIT Booth 547, A.S.T.E. Show!

Vidmar industrial storage cabinets solve

The case of the MISSING TOOL

Is the supply exhausted? Was it broken? Or is it somewhere in the dark corners of a cluttered storage area?

Nobody knows.

But we do know that VIDMAR INDUSTRIAL STORAGE CABINETS will solve this problem once and for all.

Vidmar cabinets are expressly planned and built to accommodate the sizes, shapes and weights *typical* in industrial tools, parts, gages, accessories, and sub-assemblies. Cabinets come in various heights, and so do drawers. All units are modular—can be added-to or re-arranged at any time; and they are strong...a single drawer holds up to 400 lbs. without even sagging!

In the Vidmar system, every tool and part has its place—fully visible and accessible...clean and safe...and readily located through large labels running the full length of drawers. Space savings average 50%.

That's part of the story. Before you revise or add to your storage facilities, or plan the storage in new construction, it will pay you to look into the many time- and money-saving advantages of the Vidmar system. **Write today:** VIDMAR INC., 2326 Reach Road, Williamsport, Pa.

Ask for 20-page illustrated catalog

Store more...better...in less space with **Vidmar** CABINETS

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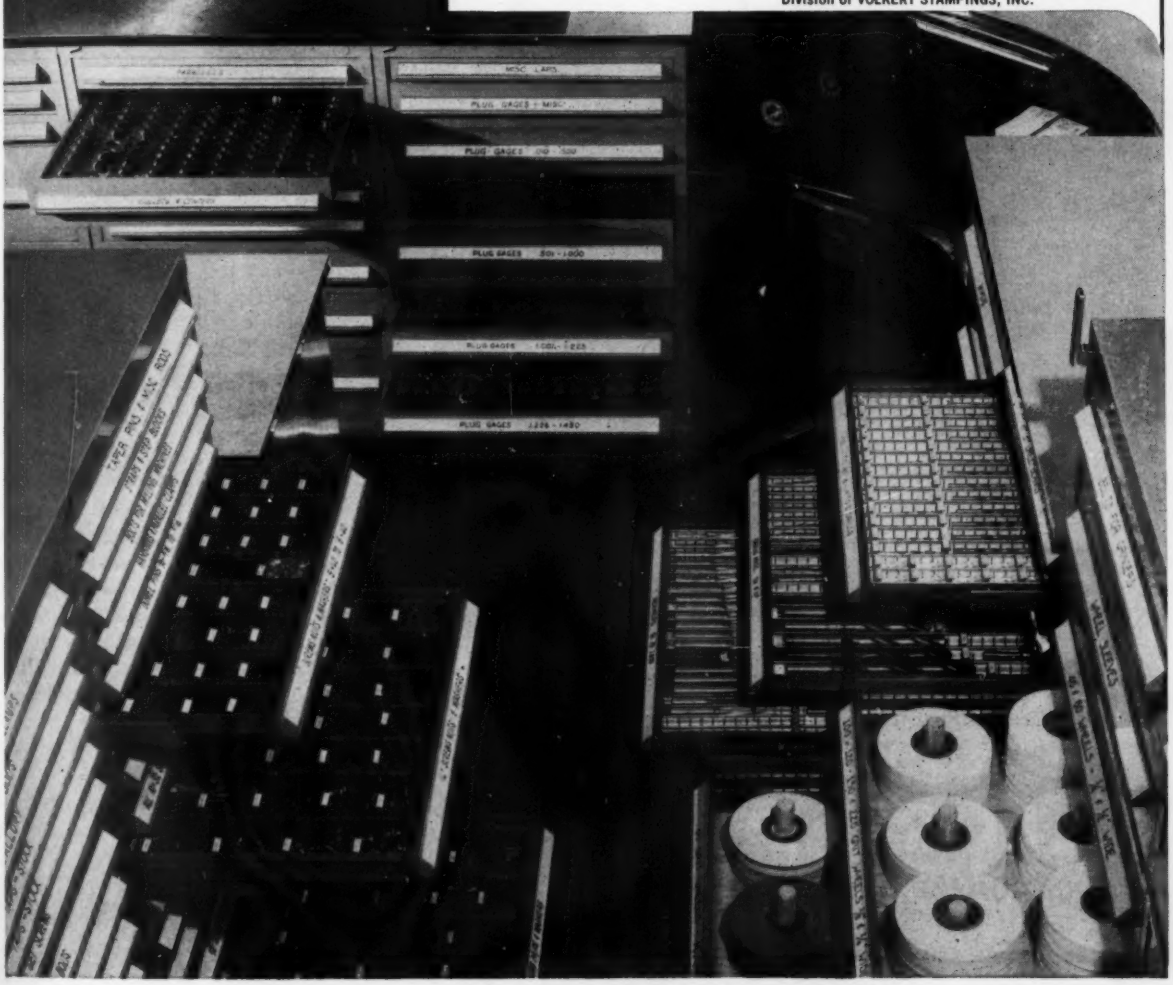
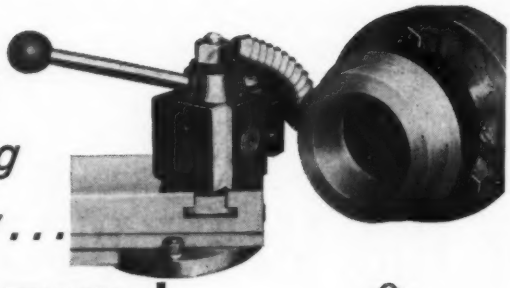


CIRCLE INFORM-A-GRAM KEY NO. 15

For Quick Changing Versatility...



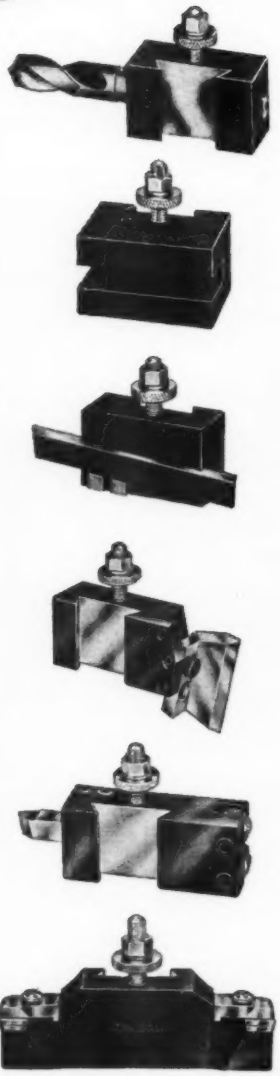
ALORIS
TOOL POSTS & TOOL HOLDERS

No other tool does all that the Aloris Tool Post does. No other Tool Holders can be changed so simply and accurately . . . and no other line is so complete!

You can change quickly and easily from one lathe operation to another. To remove the tool and tool holder you are working with, simply flip the handle and slide the tool holder out. Slide in the second tool holder, with the locked in tool bit in the exact pre-set position, flip the handle back and you're ready to run. What's more, you eliminate entirely the use of shims as each Aloris Tool Holder has its own built-in height adjustment.

You can work with extreme accuracy, without chatter or vibration, when you use an Aloris Tool Holder. The life of your tools will be longer and they can be sharpened without removing them from the Tool Holder.

Truly, with Aloris Tool Posts and Tool Holders you have quick changing versatility on all types of lathe operations.



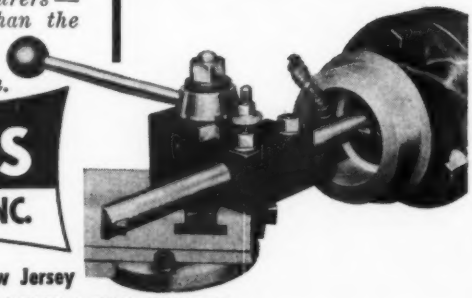
P. S. To Management:

Here is a morale building way to step-up production and cut down-time. You will have happy lathe operators and happy results, too, with Aloris Tool Posts and Tool Holders. It will pay you to specify Aloris Tool Posts and Holders — the only quick change holders recommended by leading lathe manufacturers — don't get anything less than the most modern equipment.

Write for information.

ALORIS
TOOL COMPANY, INC.

419 Getty Avenue, Clifton, New Jersey



CIRCLE INFORM-A-GRAM KEY NO. 16

. . . Month's Talk from page 14

his being raised on cutting oil. He should have some planning ability and at least be aware of the use of psychology. Those who work for him may know their machines, but they thrive on being handled properly.

Keep It Simple

The most basic of maintenance procedures, like lubrication, often fails because of its complexity. Too, those responsible for establishing a program often fail to impress others with understanding of pitfalls that can cause failure.

For the most part, pitfalls are nothing more than wrong attitudes, or failure to recognize that facts are necessary and should be sought out before procedure-decisions can be made.

For instance, what lubricant to use? This is somewhat like what befalls the plastics people, the electronics people, or anyone else with too many products to choose from. The user is befuddled—and in being befuddled, a defense is set up by the use of one or two general purpose lubricants for everything. Certainly all machinery is not built to the same fit. They don't do the same work so they require different lubricants.

Even if recommended mediums are known, through maintenance manuals, the information is of little value if it's not programmed-in and if it's not handy. Recommendations should be lifted from all the other gobbledegook the manufacturer has to put in his manual, and these should be made readily available—in short form.

Most gas station attendants are better equipped to maintain the "cheap" automobiles we trade so frequently, than we are to maintain the expensive machines we expect to use for 10- plus years. Having to decipher a few recommendations from a booklet each time it's needed is discouraging and usually not done.

We all know the five rules of good maintenance:

1. Good equipment, properly installed.

2. Properly trained maintenance personnel.

. . . Continued on page 21

VISIT BOOTH 427 ASTE SHOW, April 21-28 • DETROIT

now... over 330 standard Microbore boring bars from stock!

Your choice of over 330 Microbore standard single-tool or two-tool precision boring bars. A complete range of sizes and types available for boring and facing operations on any make of boring machine, milling machine or turret lathe. *Microbore micrometer vernier adjustment of each tool point* makes it possible to quickly set tools to *precise dimensions*. Boring range from ½" to 7¼" dia. Standard Boring Rings and Adapters extend range to 13¾". Available with Straight Shank, NMTB Taper, Morse Taper or Flash-Change. Carbide, ceramic, or high speed steel cartridges. Ordering is Simple! Fast! Direct! Standardize on Microbore—the complete tooling system.

Catalog No. 58 lists industry's most complete line of standard general purpose precision boring bars. Write for your copy.

Also available—special tooling designed from your part prints by our Proposal Engineering Department.

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CIRCLE INFORM-A-GRAM KEY NO. 17

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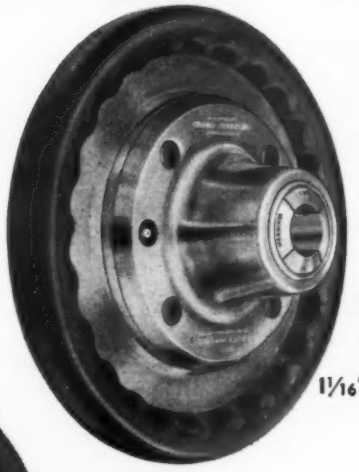
HARDINGE Sjogren Chucks

Quality at Low Cost

HARDINGE-SJOGREN Speed Collet Chucks for tool room lathes, engine lathes and grinders.

Available for Threaded Nose, Cam Lock, Taper Key Drive and American Standard Spindles.



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AVAILABLE IN FIVE COLLET CAPACITY SIZES

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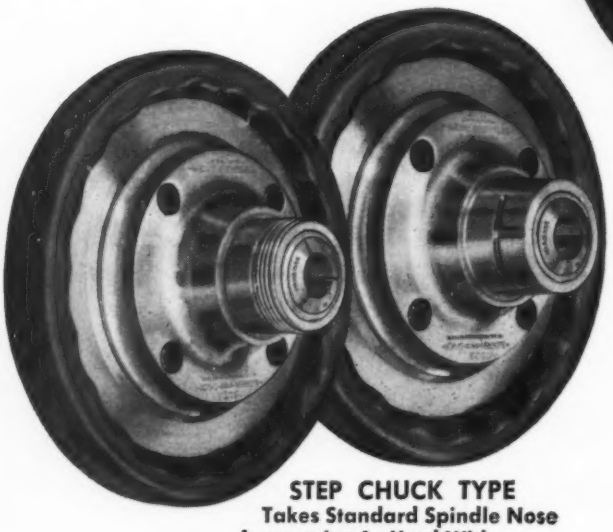

STEP CHUCK TYPE
Takes Standard Spindle Nose Accessories As Used With Hardinge Precision Machines

LEVER TYPE

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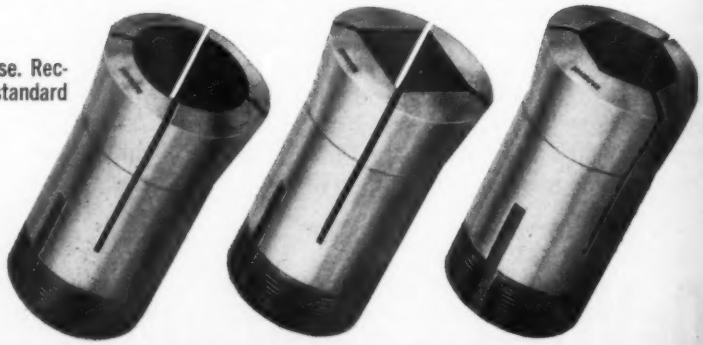
HARDINGE
ELMIRA, N.Y.

HARDINGE Low Cost Steel Collets

Maximum efficiency—Pay for only what you use. Records show that 82% of all sizes used are standard 16th sizes.

Buy only the sizes you use—Hardinge Collet stocks are available in Atlanta, Elmira, Oakland, Portland, Seattle, Boston, Hartford, New York, Philadelphia, Dayton, Detroit, Chicago, St. Louis, Minneapolis and Los Angeles. Also, Toronto, Canada.



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CIRCLE INFORM-A-GRAM KEY NO. 18

For the deepest draws on the toughest metals

Johnson's 700 WAX-DRAW does every draw in the shop. *Easy to apply* by roller coating, spraying, dipping, etc. Use wet or dry. Blanks can be fed directly into the press or may be pre-coated, dried and palletized. *Easy to remove,* using solvent bath, vapor degreaser, alkaline washer or even hot water alone. *Money saving.* One gallon undiluted covers 2,000 square feet. Four-to-one dilutions produce excellent results. 700 Wax Draw handles multiple draws with only one application even at pressures to 200,000 p.s.i. and temperatures to 450°F.

For further information write: JOHNSON'S WAX Racine, Wisconsin, Dept. TP-4

Another great metalworking product from Johnson's Wax Service Products Division

700™ wax-draw.

CIRCLE INFORM-A-GRAM KEY NO. 19

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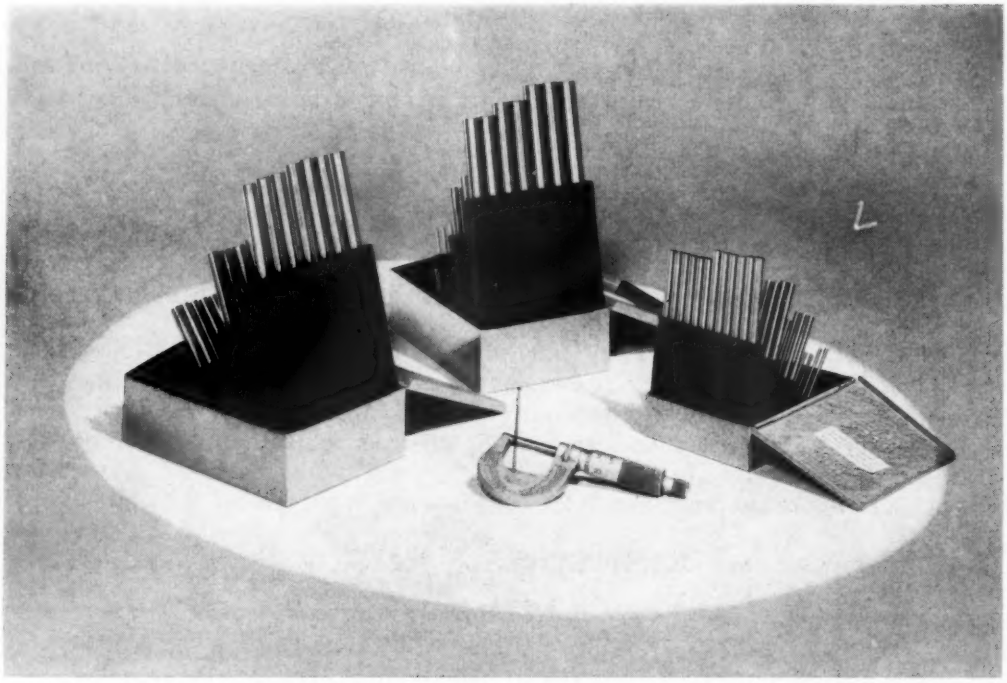
WILLIAM T. HUTCHINSON CO.

53 BROWN AVENUE SPRINGFIELD, NEW JERSEY

HUTCHINSON HSS BLANKS



115 Pieces – COMPLETE – .040" to .500" – $88.00

your choice of two tolerances
+ .0002" − .0000
or
+ .0000 − .0002"

JOBBER SET	LETTER SET	WIRE SET
$32.27	$29.03	$27.40
in Huot Index	in Huot Index	in Huot Index

M2 — HIGH SPEED STEEL — 64 "C" scale hard — gage tolerance — mirror finish — parallel ground.

ANY DECIMAL DIAMETER OF STANDARD LENGTH
.012" TO 1.000" SHIPPED ON 24 HOUR NOTICE

CIRCLE INFORM-A-GRAM KEY NO. 20

. . . Month's Talk from page 16

3. Adequate maintenance records.

4. Well scheduled PM work.

5. Proper tools, and a minimum inventory of replacement parts.

Even though we recognize these rules **as strict necessities,** how much time and money is thrown away daily because they're broken?

What new equipment went into plants last year that immediately created new maintenance problems because a maintenance plan was not put into action right away? How many times was the wrong man sent to do a job? What repeat repairs were there because records that could have shown the true problem were not consulted? How much inspection wasn't made because of manpower shortage? How much downtime was there for lack of replacement parts, due to poor recording?

Little Costs Mount Up

Millions of dollars of Industry's operating money go out the window needlessly. Certainly this money could have been better spent in plant improvements, new machinery, and returns to stockholders.

The total cost of many little maintenance jobs can be tremendous. Things like a continuous blowing of fuses when their links are unknowingly subjected to unusual vibration. Or excessive repair and tire wear on pallet trucks, due to their being used for long distance hauling rather than close-quarter work.

You'll find a good analogy in what happens to plant compressed air costs when small leaks are allowed to exist. For instance, at 90 lb pressure a leak whose total area is equal to a 1/32 orifice robs the system of 1 cu in of air a min. Leaks are seldom this large, but for talking purposes, if you had a leak of this size for every machine using air, each would be wasting about 500 cu in of air/8-hr shift. At a 10¢/cu ft, (round figures) you might waste $4.00/day/machine.

Multiply this by 250 working days you find you are throwing

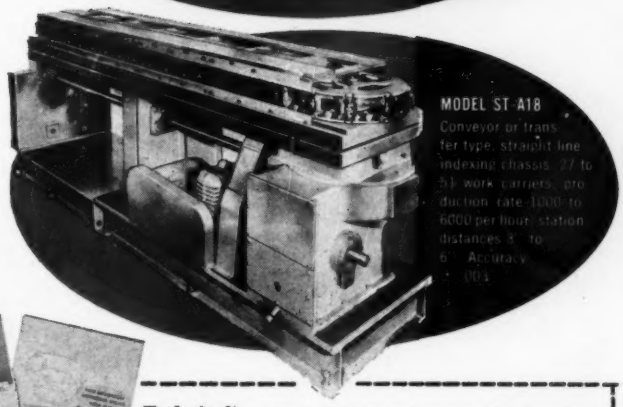
. . . Continued on page 24

You can
PRODUCE & ASSEMBLE *Automatically*
when your machine is designed around a Standard Tool
INDEXING UNIT

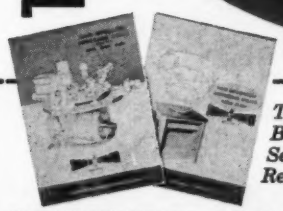
The Heart of Automatic Machines

MODEL ST-A9A
Compact light to medium duty cam indexing unit, 8 to 20 index positions, 90° to 270° cams, 13½" to 24" dial plates. Accuracy ± .001 at 8" radius.

MODEL ST-A9B
Heavy duty cam indexing unit, 8 to 24 index positions, 18" to 24" dial plates. Accuracy ± .001 at 10½" radius. Production rate 600 to 6000 per hour.



MODEL ST-A18
Conveyor or transfer type, straight line indexing chassis, 27 to 51 work carriers, production rate 1000 to 6000 per hour, station distances 3" to 6". Accuracy ± .001.



Technical Booklets Sent on Request!

Standard Tool engineers will be pleased to help you in selecting the indexing unit to meet your exact requirements.
Also ask for Standard Tool facilities brochure.

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STANDARD TOOL AUTOMATION
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CIRCLE INFORM-A-GRAM KEY NO. 21

GET TRUE READINGS ON FINISHES EVERYTIME, EVERYWHERE WITH SURFINDICATOR

Job to job, plant to plant, *every* Brush Surfindicator gives true and identical readings from 0 to 1000 microinches on the same surface. Precision reference standard comes with every unit; makes field calibration simple and eliminates need for factory adjustment. The Surfindicator is immune to magnetic fields, vibration, line voltage variations; weighs but 15 pounds and is completely self-contained. **ONLY Brush Surfindicator Complies Completely With ASA and MIL Specs. See For Yourself. Request A Demonstration.**

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DIVISION OF CLEVITE CORPORATION
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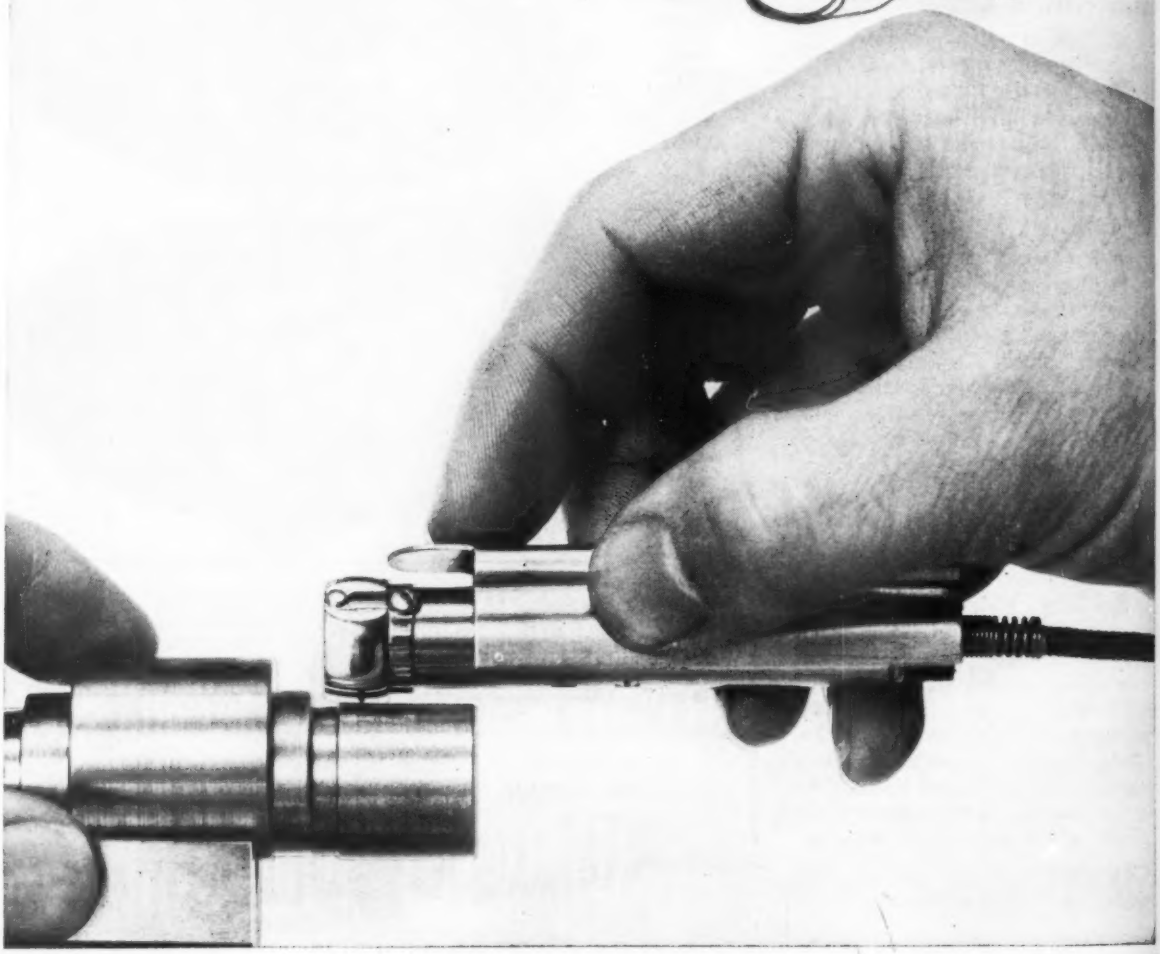
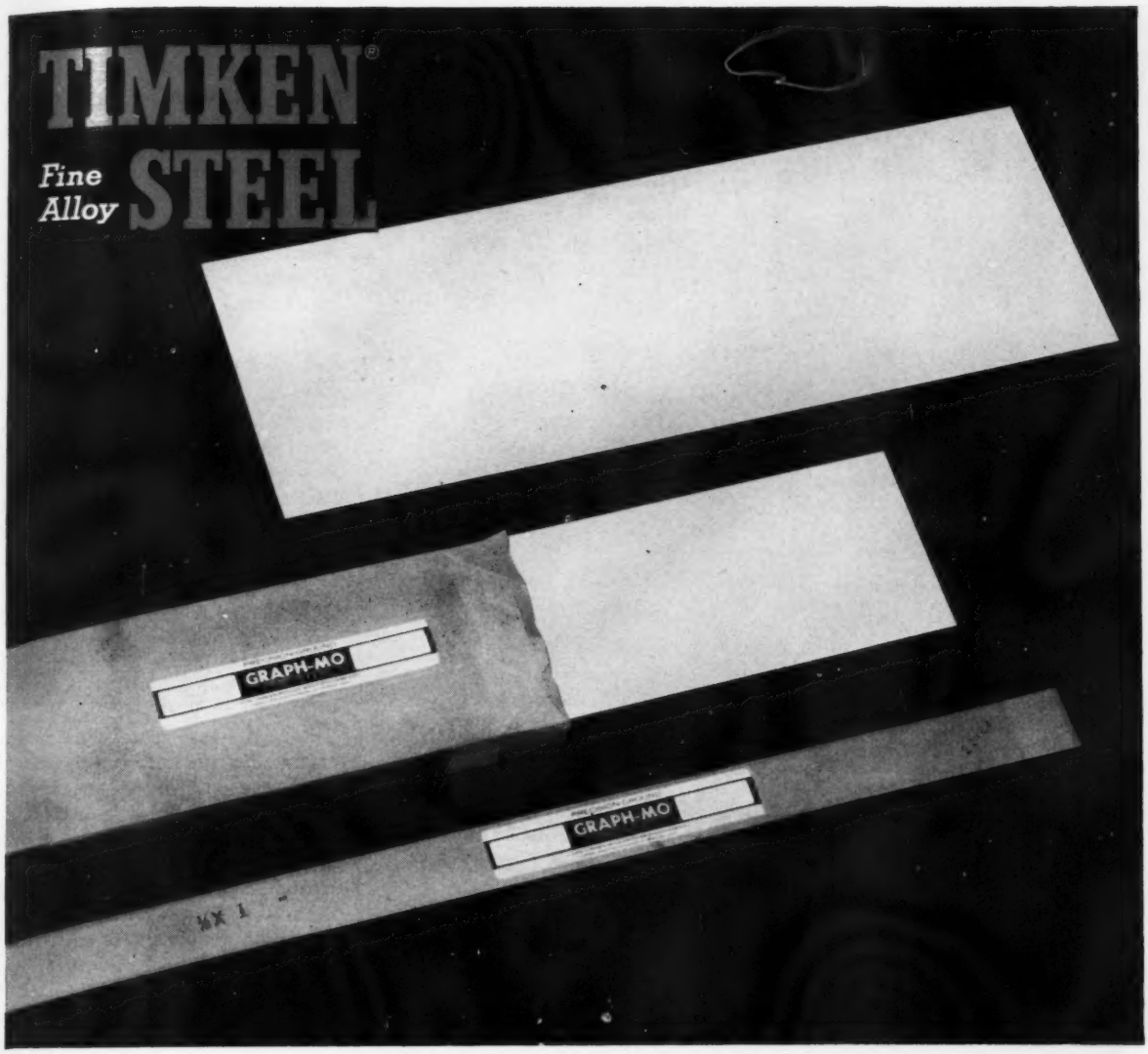


CIRCLE INFORM-A-GRAM KEY NO. 22



How tool steel users save 5 ways with precision ground flats of GRAPH-MO®

Now you can have all the advantages of high-quality graphitic tool steel in a new, convenient form. Specify Graph-Mo® in precision ground flats and save because:

1. **GRAPH-MO OUTWEARS** ordinary tool steels 3 to 1 because of free graphite particles and diamond hard carbides in its structure.
2. **SEMI-FINISHED** precision ground flats save you time and money by eliminating some preliminary operations.
3. **30% EASIER MACHINING** saves you still more when you specify Graph-Mo.
4. **GRAPH-MO'S HEAT TREATING** response is uniform, eliminates distortion in preparation.
5. **SPECIAL PROTECTIVE WRAPPING** assures top condition when you get ready to use your Graph-Mo precision ground flats.

There is only one Graph-Mo and the Timken Company makes it. Graph-Mo precision ground flats are available in 250 different sizes to give you maximum savings. Get your stock list from your local Timken steel distributor or write direct to: The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.*

TIMKEN GRAPHITIC STEELS ARE CARRIED IN STOCK BY 9 DISTRIBUTORS WITH 47 WAREHOUSES IN 39 CITIES IN THE UNITED STATES AND CANADA

CIRCLE INFORM-A-GRAM KEY NO. 23

OSBORN

BEFORE BRUSHING
Insulation residue on this small, copper electric motor commutator was a knotty, costly cleaning problem. Rate: 800 per hour.

AFTER BRUSHING
Surface quality-finished . . . insulating material and feather burrs gone . . . ready for trouble-free assembly. Rate: 3500 per hour.

Production soars from 800 to 3500 pieces per hour

...with OSBORN power brushing

PRODUCING at the rate of 3500 pieces per hour (over 330% greater than former off-hand method) these Osborn TY® Master® Wheels remove troublesome phenolic-type residue from electric motor commutators at Dayton Precision Manufacturing Co.

Slow, off-hand methods were being used to remove insulation residue from these commutators. Production was costly . . . parts lacked uniformity.

A specialized, but simple machine now handles the operation. Parts are automatically fed along a guide tube and through a pair of Osborn TY® Master® Wheel brushes. In this centerless type finishing setup—the job is done effectively in pre-set time cycles. Results: production and quality up—rejects eliminated . . . time and costs down.

Cleaning and finishing problems in your plant can be solved with similar production savings. An Osborn Brushing Analysis—made in your plant now at no cost or obligation—is the first step. Write us for full details. *The Osborn Manufacturing Company, Dept. L-3, Cleveland 14, Ohio.*

'60 Booth 1305

Osborn Brushes

METAL FINISHING MACHINES . . . AND FINISHING METHODS
POWER, PAINT AND MAINTENANCE BRUSHES • FOUNDRY PRODUCTION MACHINERY

CIRCLE INFORM-A-GRAM KEY NO. 24

. . . Month's Talk from page 21

away about $1000/machine/yr on air leakage alone. Even if we cut this in half to be realistic, it's still $500/machine. Multiply this by 100 machines in your plant and you get $50,000/yr going into the air.

If a small item like this can cause unproductive expenditures of this magnitude, what can downtime from poor maintenance cost? No one knows until he examines his present system—or puts one in.

Consider These Costs

A few years ago one branch of the military found they could save close to $100-million a year by a mere improvement of maintenance scheduling and the use of tried systems for establishing maintenance costs.

With plant operating costs continually on the rise, the important figures to watch are not maintenance cost increases or decreases, but maintenance cost percentages compared to profit.

A report last year based on operating figures of approximately 800 manufacturing companies put forth an $8-billion expenditure for maintenance and repair, during a period when net sales were $200-billion. Suppose we consider all these companies to be the same size; their maintenance cost would round out at $10-million per company. This is a pretty big chunk of dough.

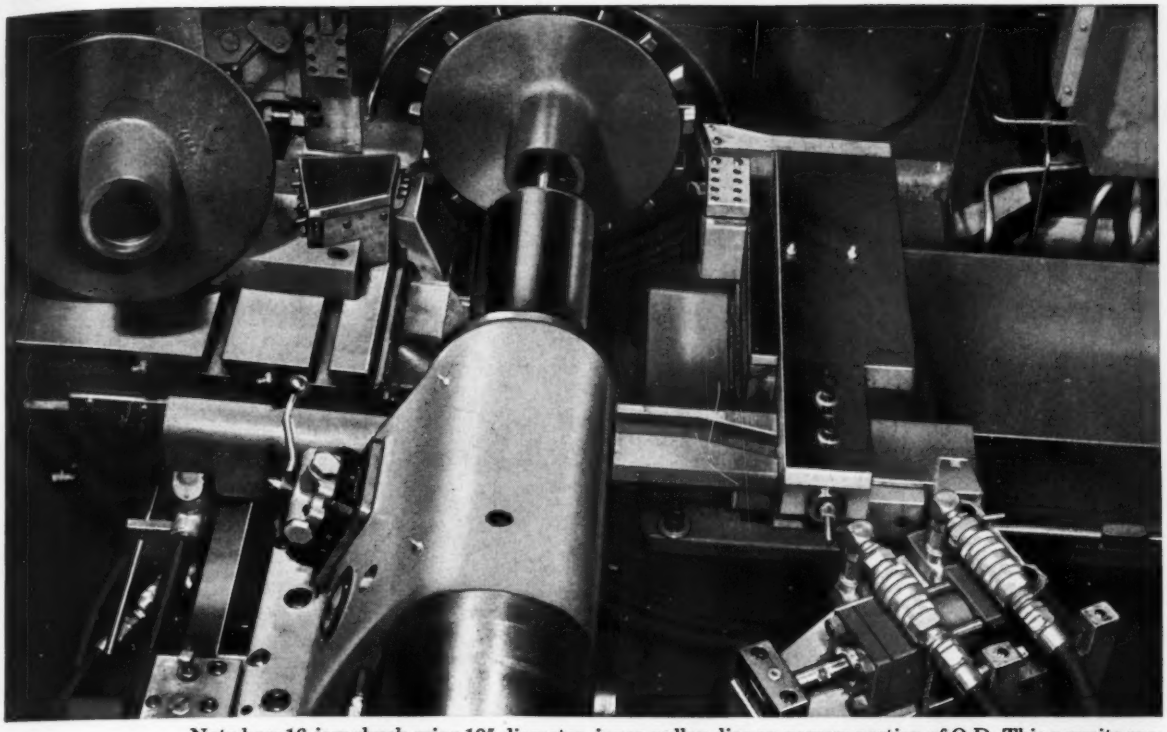
So these are big companies, you say. Let's say some were only one-tenth as large as others—perhaps their maintenance expenses were just a million—still pretty big.

It boils down to the fact that their maintenance costs averaged 4% of their net sales. Now this figure isn't so bad, but when you stop to think of the percentage cost of maintenance compared to net profit, the figure is astounding. Actually, it's 70% of their net profit. Now that figure is impressive.

If, in this report, the $8-billion maintenance cost could be reduced $2-billion, which is just 1% of net sales, we could add $2-billion to profit—which is gravy.

• Do you help your maintenance people to carry out effective procedures?

. . . Continued on page 26



Note how 16-jaw chuck grips 10″-diameter, inner pulley disc on narrow portion of O.D. This permits machining entire flange face. Accurate taper is generated by cam-operated sliding toolholder shown at right.

No. 12 replaces two manual lathes, cuts time 53%

Automatic cycle, fast setup cut job-lot costs...free operator for other work.

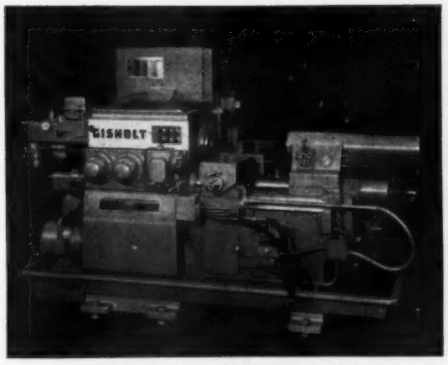
This fast, versatile setup may give you some new ideas on paring job-lot costs. Lewellen Manufacturing Company, Columbus, Indiana, uses it for machining three types of cast iron pulley discs in 15 sizes—in lots ranging from 50 to 100 pieces.

Previously this work required two manually operated lathes. Now one operator does the entire job 53% faster on one Gisholt No. 12 MASTERLINE Automatic Chucking Lathe.

Here's how a typical inner pulley disc, 10″ in diameter, is handled: To permit machining beyond the tapered face, the work is held on a narrow portion of the previously turned O.D. in a 16-jaw chuck. A chuck-mounted mandrel with tailstock support provides rigidity for higher speeds and feeds.

Front carriage tools turn the hub O.D. within .0005″ and form the base radius. The flange is taper-faced from a cam-controlled sliding toolholder on the rear independent slide. A second tool faces the hub end. Time, just 2.2 minutes, f.t.f.

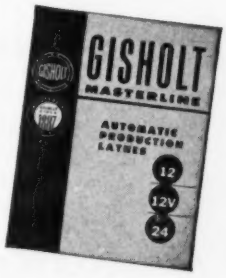
Change-over for different sizes averages less than 30 minutes. One 30° adjustable cam handles all tapers. Quick-disconnect fittings are easily reversed for tool relief when changing from inner to outer discs.



Gisholt MASTERLINE No. 12 Automatic Chucking Lathe

FOR COMPLETE INFORMATION

on how the No. 12 can cut your costs on job-lots and production runs, contact your Gisholt Representative—or write for new catalog, Form 1213.



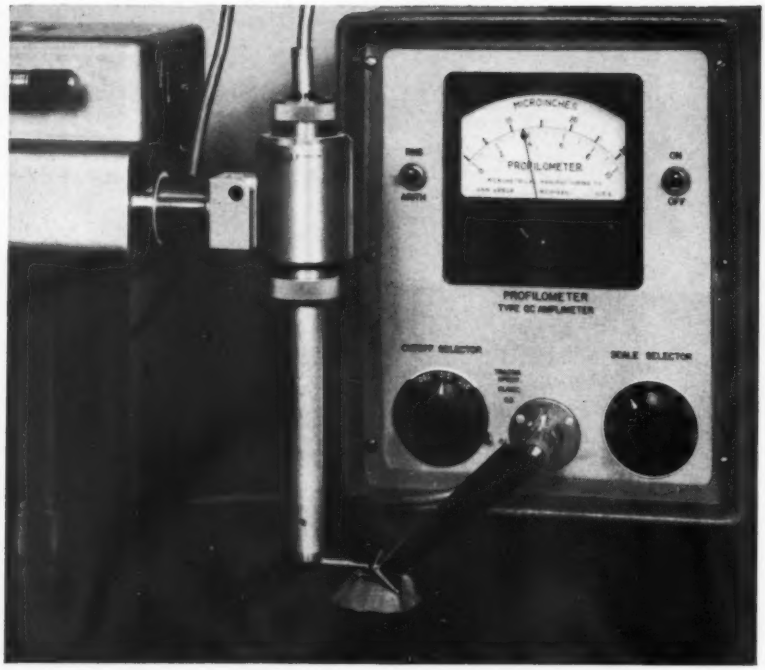
GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • *Factory-Rebuilt Machines with New-Machine Guarantee.*

Investigate Gisholt's Extended Payment and Leasing Plans

CIRCLE INFORM-A-GRAM KEY NO. 25



PERTINENT QUESTION:

WHY do you need the Profilometer®?

FACTUAL ANSWER:

To check practically *all* surfaces against microinch roughness specs —and to help cut production costs in 7 different ways.

FREE BULLETIN LT14 gives details on the Profilometer and its practical applications. May we send you a copy?

MICROMETRICAL MFG® MANUFACTURING COMPANY
345 S. MAIN ST. ANN ARBOR 6, MICHIGAN

Manufacturer of the PROFILOMETER®, PROFICORDER®, MICROCORDER®, WAVOMETER®, ANDEROMETER®, VAROMETER®, CHART VIEWER • Exclusive American Sales Agent for CENSOR Dimensional Gaging and Sorting Equipment

CIRCLE INFORM-A-GRAM KEY NO. 26

. . . Month's Talk from page 24

• Do you have the right tools for those you have trained, so they can best exercise their abilities?

• Are you figuring-in inspection time—and test time in your preventive maintenance program? The key to this door is workable-selectivity as to inspection.

• Do you use visual inspection to supplement testing—and vice versa?

• The three phases of maintenance—preventive, repair, and housekeeping—you know well, but do you have all phases balanced-in whereby each is practiced with effort respective to its importance?

• Are you able to use a maintenance service organization? If so, choose it well.

• Do you take an objective look at your program periodically? Nothing is static, if it's optimum it must be constantly changing.

• Are your "maintenance stores" costing you too big a chunk of the overall? Weeding out, consolidating and keeping proper records can save significant sums here.

• Is your maintenance area an efficient one in regard to layout, traffic, and circulation?

• Are you standardizing on procedures—in other words, profiting by past experience?

• Are you able to use punched card techniques—so helpful for small plants which can't efficiently use more complex systems, but which need more than an honor system?

• Are you able to save time with small profitable workshops that go to the work?

• Are you able to look ahead to expansion and be ready with personnel to maintain new and different equipment which you will be installing?

• Are you looking ahead to the effectiveness of your program next year; five or ten years from now? Its effectiveness then may well depend on how you "bring up" your people today.

These are not just idle questions. They are questions every plant executive must ask himself regularly.

end

QUICK COMPARISON CHART

Some unique combinations of electrical and physical properties in Anaconda metals that may save you money—handle tough jobs better

Properties shown for precipitation-hardened condition—Heat-treatable alloys	ELECTRICAL CONDUCTIVITY % IACS	TENSILE STRENGTH psi	YIELD STRENGTH at 50% ext. under load, psi	ELONGATION % in 2 in. or 4xD	MACHINABILITY compared with F.C. Brass at 100	FORMS AVAILABLE
Chromium Copper-999 (Cu 99.05%, Cr .85%, Si .10%)	75	85,000	55,000	20	20	Rod Wire Tube Forgings Strip
Leaded Nickel Copper-831 (Cu 97.8%, Pb 1.0%, Ni 1.0%, P .2%)	55	80,000	70,000	7	80	Rod
Cunisil-837 (Cu 97.5%, Ni 1.9% Si .6%)	30 to 42	90,000	70,000	8	40	Rod

To give you a basis of comparison, here are properties of two standard Anaconda electrical coppers

ETP Copper—100 (Cu 99.9+%)	100	48,000	40,000	15	20	All mill forms
Leaded Copper—126 (Cu 99.0%, Pb 1.0%)	98	48,000	40,000	12	80	Rod bar

The values given above are intended as a guide to some unusual combinations of electrical and physical properties available among Anaconda alloys. If any of them gives you an idea for possible solution to a tough problem or indicates a way to cut costs without sacrificing quality or performance — see your American Brass representative for more details. Or send in this coupon today. 5949

COPPER • BRASS • BRONZE • NICKEL
SILVER MILL PRODUCTS

ANACONDA®
PRODUCTS

Made by The American Brass Company

The American Brass Co., Waterbury 20, Conn.
In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

Please send me more information about the following alloys:

☐ Chromium Copper—999 ☐ Leaded Nickel Copper—831
☐ Cunisil—837 ☐ Leaded Coppers
☐ Electrolytic Tough Pitch Copper—100

Name.....
Company.....
Street.....
City.....Zone.....State.....

CIRCLE INFORM-A-GRAM KEY NO. 27

Six Ways to Save... ON ALUMINUM BRONZE WEAR STRIPS AND WEAR PLATES

MEET JACK: A fictitious character we have chosen to illustrate a non-fictitious story

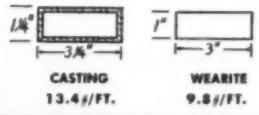
LENGTH

Jack needed 4 rectangular wear strips, each 36" long. Always before, he ordered 8 castings, each 18" long and had to splice them together. NOW . . . Jack has found out about MEIER WEARITE EXTRUDED ALUMINUM BRONZE RECTANGLES and how it comes in any length up to 10 feet long, so he specifies the exact length.

AVAILABILITY

Jack used to have to wait 2 or 3 days for castings, since that is the usual required time to have them made up. Now Jack orders Wearite and gets it right off the shelf of the local distributor, which saves him time.

SIZE (On a 1X3 wear plate, for example)

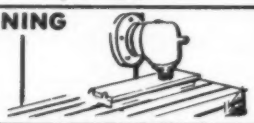


There was a time when Jack would have to order his castings oversize and machine them down to the required size. Jack did this to get rid of the sand inclusion which was around the surface. "Why wear out good cutting tools to remove excess scrap" Jack reasons. "With Meier Wearite little or no 'cleanup' work is required, and I can choose from *94 different sizes* of stock."

QUALITY

Jack has found out since he has switched to Wearite that the new metal is a "quality" metal. WEARITE EXTRUDED RECTANGLES are produced from semi-continuous cast billets under the strictest of laboratory control. This makes them tough and longer lasting.

MACHINING



When machining is required, Jack has found that he prefers the Wearite to castings. Extruded metals are free from porosity and have a homogenous structure; this makes Wearite easier to machine.

COST

But what makes Jack really happy . . . REALLY, REALLY happy . . . is that besides all of these advantages he has found that pound for pound of usable metal MEIER WEARITE EXTRUDED ALUMINUM BRONZE RECTANGLES COST LESS!

SEND FOR FREE CATALOG and SAMPLE TODAY

See WEARITE at Booth 2020, ASTME Show, April 21-28, Detroit

Meier
BRASS & ALUMINUM
Company

1471 E. NINE MILE RD., HAZEL PARK (DETROIT) MICH.

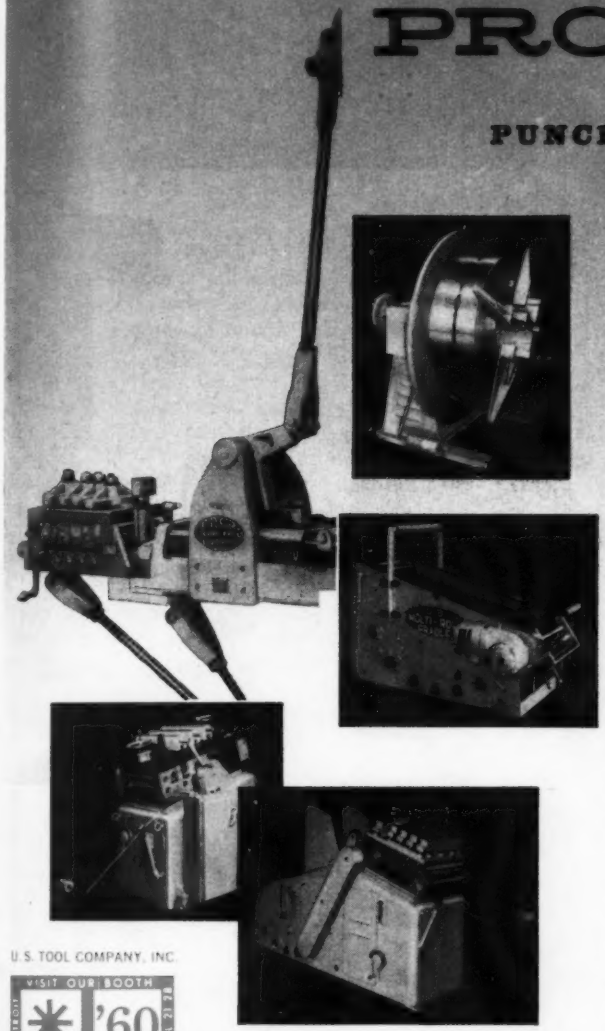
Long distance telephone number . . . 313 JOrdan 6-3902

Distributor inquiries invited

CIRCLE INFORM-A-GRAM KEY NO. 28

PROPOSAL

FOR PROFITABLE
PUNCH PRESS PRODUCTION



When the familiar orange and black U. S. Tool Proposal reaches your desk you are on the road to Punch Press Production that will please the most pessimistic.

There is no "high pressure" in a U. S. Proposal. Each one details our method of handling the material for the particular metal stamping project involved. You get the facts . . . you get the figures.

To insure positive Punch Press feeding, major press manufacturers often specify U. S. Feeds and U. S. Stock Straighteners as original equipment. They do so because they know that **Profitable** Punch Press Production depends upon the utmost efficiency, from coil stock to finished stamping.

Consider your present equipment — is it really set-up for **Profitable** Punch Press Production? If not, let us submit our PROPOSAL to help you achieve greater efficiency and economy in your stamping operations.

Send for Bulletins No. 85P and 151P.

Illustrated here are (reading from top to bottom): ACR-1642 U. S. Automatic Centralizing Reel; ACC-1648 U. S. Automatic Coil Cradle; SF-68A U. S. Slide Feed with Plain Straightener; PDS-16H U. S. Power Driven Straightener; PDSC-1648 U. S. Combination Cradle-Straightener.

U.S. TOOL COMPANY, INC.

VISIT OUR BOOTH '60 ASTE TOOL SHOW

BOOTH 1520

U S PRODUCTS

U. S. TOOL COMPANY, INC.

AMPERE (East Orange) N. J.

CIRCLE INFORM-A-GRAM KEY NO. 29

UNIVERSAL JIG AND FIXTURE COMPONENTS AND CLAMP ASSEMBLIES

Shown here are a few of more than a thousand different items in regular steel and stainless steel —the largest and most complete selection in the United States—now available from Universal Engineering Co. Write today for your copy of the complete, new catalog.

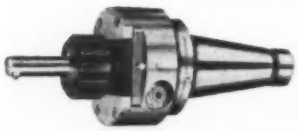
213

OTHER PRECISION-BUILT COST SAVING UNIVERSAL PRODUCTION TOOLS

Floating Chuck

Standard Collet Chuck

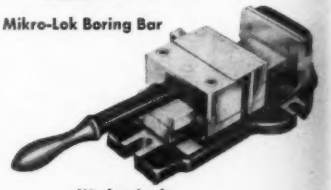
Mikro-Lok Boring Bar



Boring Chuck

"Kwik-Switch" Tool Holder

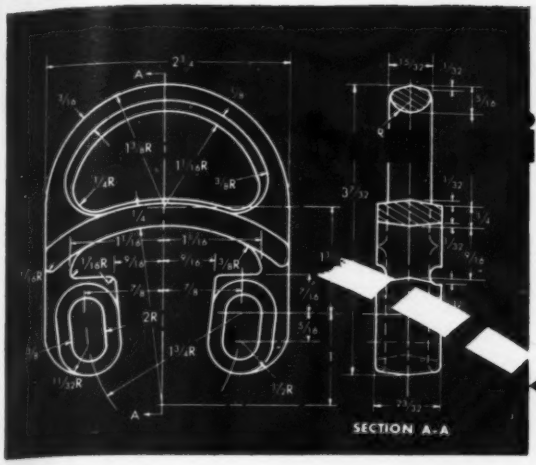
Standard Drill Bushing



Wedge-Lock Production Vise

UNIVERSAL ENGINEERING COMPANY, FRANKENMUTH 8, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 30



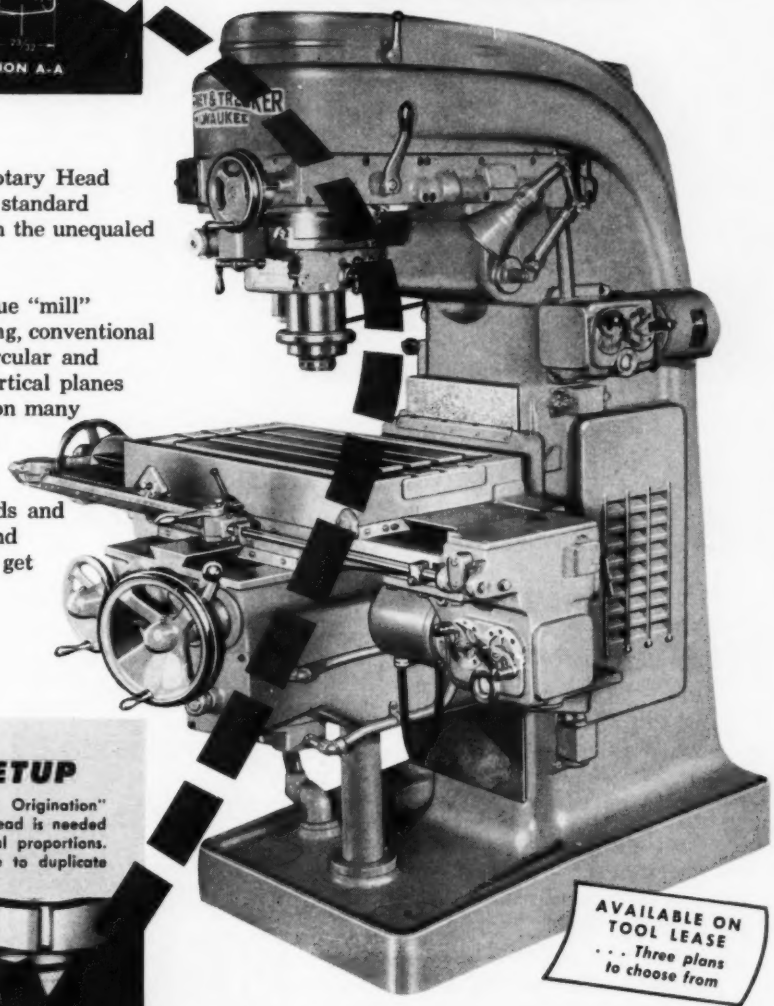
int to finished product in a single setup

. . . WITHOUT TEMPLATES AND TRACING EQUIPMENT

The Kearney & Trecker Model D Rotary Head Milling Machine is the most *versatile* standard machine tool in existence today — with the unequaled bonus of *accuracy* to tenths.

The rotary head design of this unique "mill" permits precision boring, drilling, slotting, conventional vertical milling, and the milling of circular and angular cuts in both horizontal and vertical planes with the simplest of setups — in fact on many jobs, such as the one illustrated below, only a single setup is required.

If you're machining tools, dies, molds and other parts requiring multiple radii and extremely close tolerances, be sure to get all the facts on the Model D Rotary Head Milling Machine.



AVAILABLE ON TOOL LEASE . . . *Three plans to choose from*

BRASS DIE COMPLETED IN
ONLY ONE SETUP

A new machining principle called "Multiple Origination" provides that only one setting of the rotary head is needed to handle one or more operations of identical proportions. After the head is set, merely move the table to duplicate the preset machining motion exactly.

Call your local Kearney & Trecker representative or write today and ask for the Model D Literature File.

KEARNEY & TRECKER MILWAUKEE ®

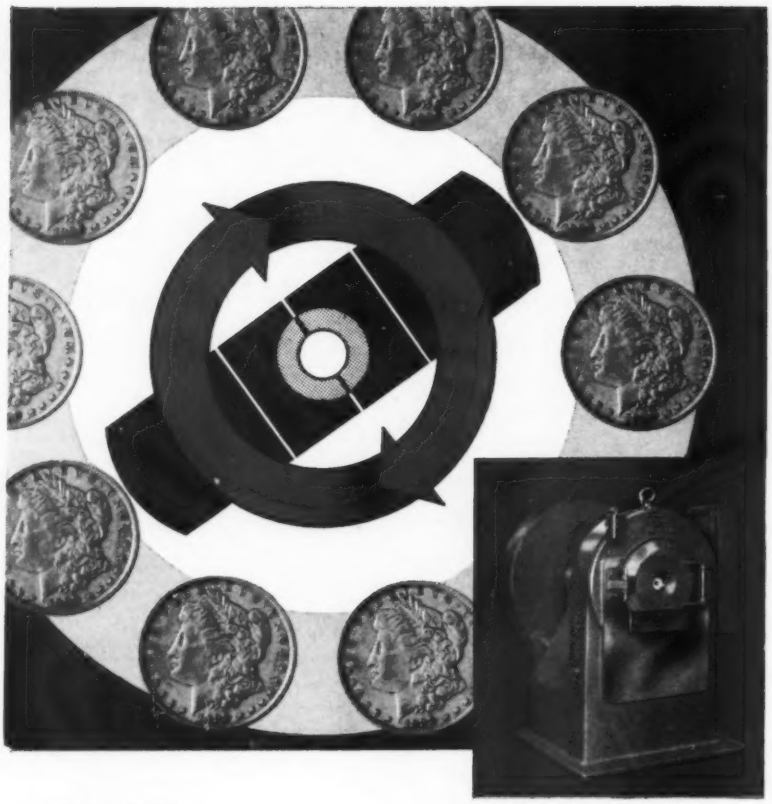
Standard Machinery Division

KEARNEY & TRECKER CORP.

6800 W. NATIONAL AVE. • MILWAUKEE 14, WIS.

(Phone GReenfield 6-8300... Direct Distance Dialing Code 414)

CIRCLE INFORM-A-GRAM KEY NO. 31

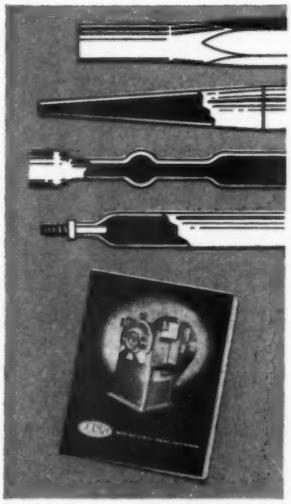


Moneymaker

Fenn Rotary Swaging makes money by saving money for its users. In fact, with swaging, you save five ways:

- low initial capital investment
- tooling is relatively low in cost
- material savings
- labor savings
- time savings

Fenn Swaging Machines offer many advantages in both design and construction. They perform an almost limitless variety of pointing, tapering, reducing, sizing, and assembly operations. Capacities range on solid bar stock from 5/32" to 3⅜", and tubing to 6". To be sure that you are not machining when you should be swaging, write for Fenn swaging catalog.



FENN *Sets the Pace* IN ROTARY SWAGING

Fenn Manufacturing Company • 402 Fenn Road • Newington, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 32

The appointment of **Ralph H. Spresser** as Detroit district manager of The National Acme Co. has been made known.

Mohawk Tools, Inc., recently appointed **Guy Priest, Jr.,** district sales manager in Delaware, Maryland, New Jersey, eastern Pennsylvania, and eastern New York, with headquarters in Trenton, N.J.

Theodore L. Theodorff is the new district manager of the Lake Erie Machinery Corp. Detroit office, which serves Detroit and the eastern half of Michigan. Western district manager, **Robert A. MacLean,** has headquarters in Los Angeles.

The Miller Fluid Power Div'n of Flick-Reedy Corp. has promoted **Charles W. Dauer** to district sales manager; **Emil Galandak,** chief sales engineer; and **Robert E. Wilshek,** western district sales manager.

New vice president in charge of sales at The Dumore Co. is **Harry L. Wardrip.**

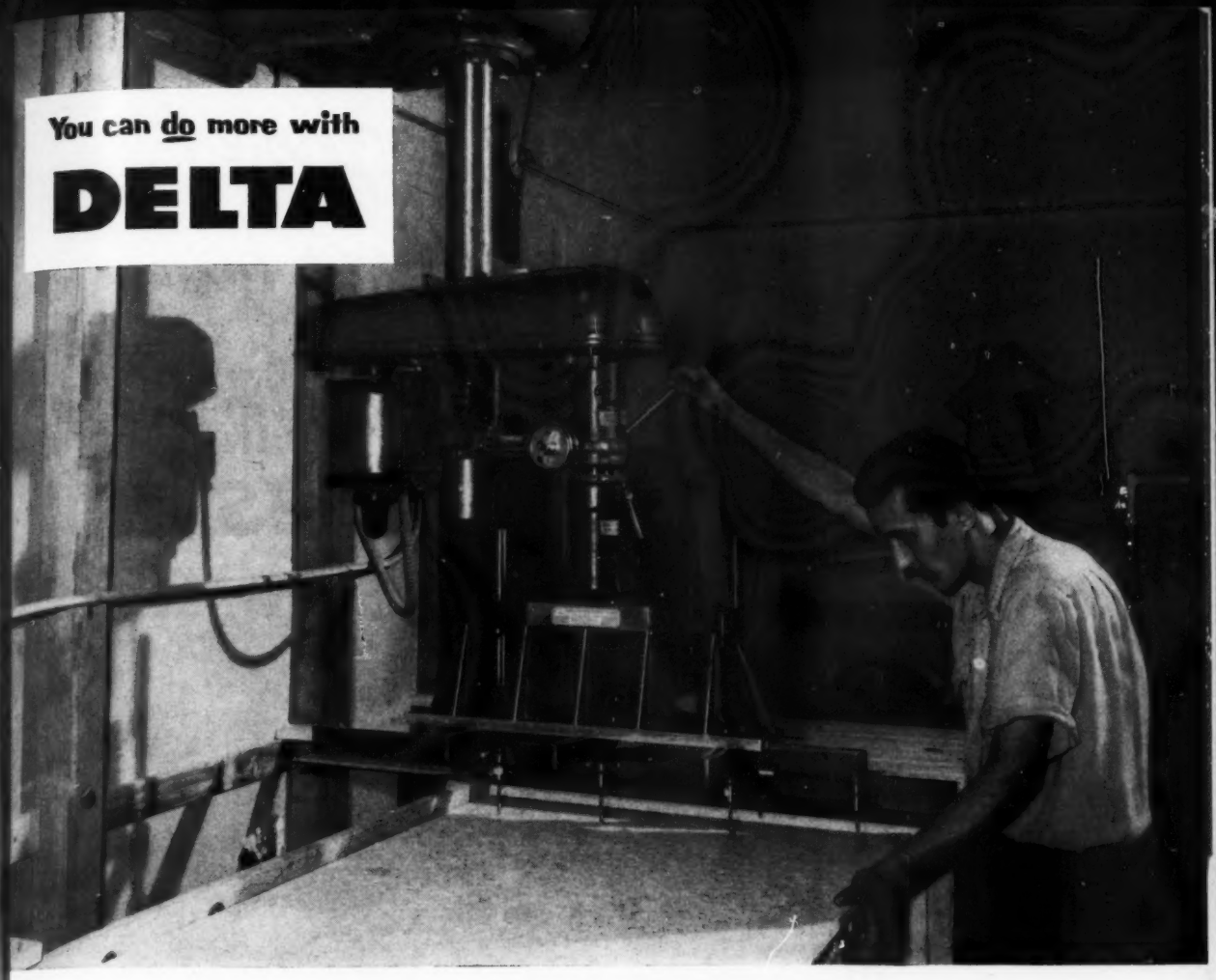
The appointment of **David S. Flint** as a mid-western tool and methods engineer for Wales-Strippit, Inc., has been made known.

Frank C. Holmes was recently appointed vice president of sales for Baird Machine Co.

Taking over as sales manager of Ampco's West Coast division is **Gordon E. Brown,** with **Wayne E. Freeberg** assisting.

Ralph Ames and **William Ranney** of the A-R-G Fluid Power, Inc., are sales representatives in Rochester, N.Y., for The Galland-Henning Nopak Division.

E. F. Houghton & Co. recently announced the appointment of **Saul Silverman** to its metalworking service staff.



Costs cut 50% in multiple hole drilling

Delta 17" Drill Press, also 20", 15", 14" and 14" Super-Hi Sensitive. Available in floor, bench and multiple-spindle models.

Suspending a standard 17" Delta drill press from an angle iron wall bracket over a table not only *doubled* productivity, but resulted in greater accuracy in wide panel drilling work for S & S Visual Company, a Brooklyn display firm. Use of a Commander multiple spindle drill head permits simultaneous drilling of up to 15 holes in a line 35" long. Avoiding costly single-purpose equipment, the firm used versatile, standard Delta components for this relatively inexpensive installation.

Every model in the world's most complete drill press line offers the power, precision performance and ruggedness that have set industry standards for years. Delta drill presses give you better value for your money—they cost less to buy, less to operate and less to maintain.

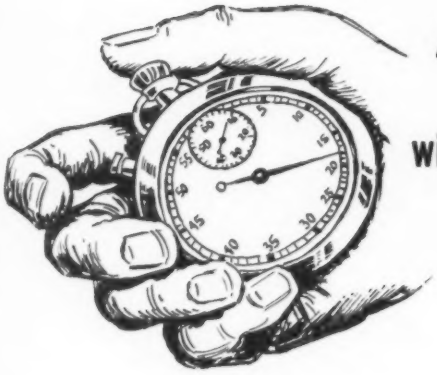
To match the tools to *your* needs, visit your Delta Industrial Distributor (listed under "TOOLS" or "MACHINERY" in the Yellow Pages). And for a FREE Delta Industrial Catalog showing 61 machines, 302 models, over 1400 accessories, write: Rockwell Manufacturing Company, Delta Power Tool Division, 622-DD N. Lexington Ave., Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Company of Canada, Ltd., Guelph, Ontario.

Visit Delta in Booth No. 2046 at the A.S.T.E. Show

DELTA INDUSTRIAL TOOLS
another fine product by
ROCKWELL

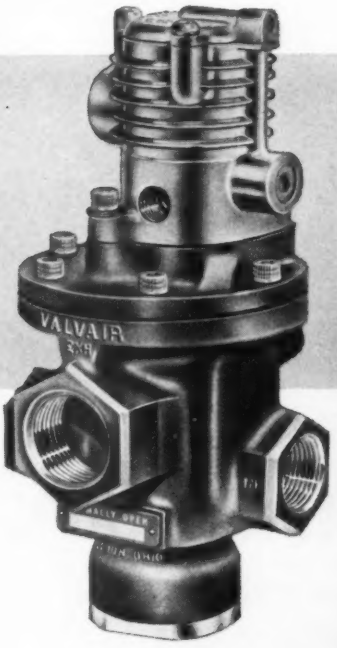
CIRCLE INFORM-A-GRAM KEY NO. 33

split-second response! more work per hour!



with **Valvair®** HI-SPEED INLINE **VALVES**

- **solenoid coil guaranteed against burn-out for life of valve**
- **instant-action control • air-cushioned poppet**
- **multi-million cycle dependability • JIC pilot**



HI-SPEED INLINE with integral pilot, 2- or 3-way, NO or NC, 3/8 to 1¼ in. NPT.

Short poppet travel in Valvair's HI-SPEED INLINE provides maximum flow almost instantaneously. This shortens machine cycle time . . . lessens brake and clutch slip . . . provides more accurate cuts on high speed cut-offs . . . decreases set-up time . . . minimizes drift, for safer operation.

For increased production . . . lower costs . . . greater safety . . . specify Valvair HI-SPEED INLINE valves.

Write for free Bulletin HIN. Address: Valvair Corporation, Akron 9, Ohio, Dept. TP-460.

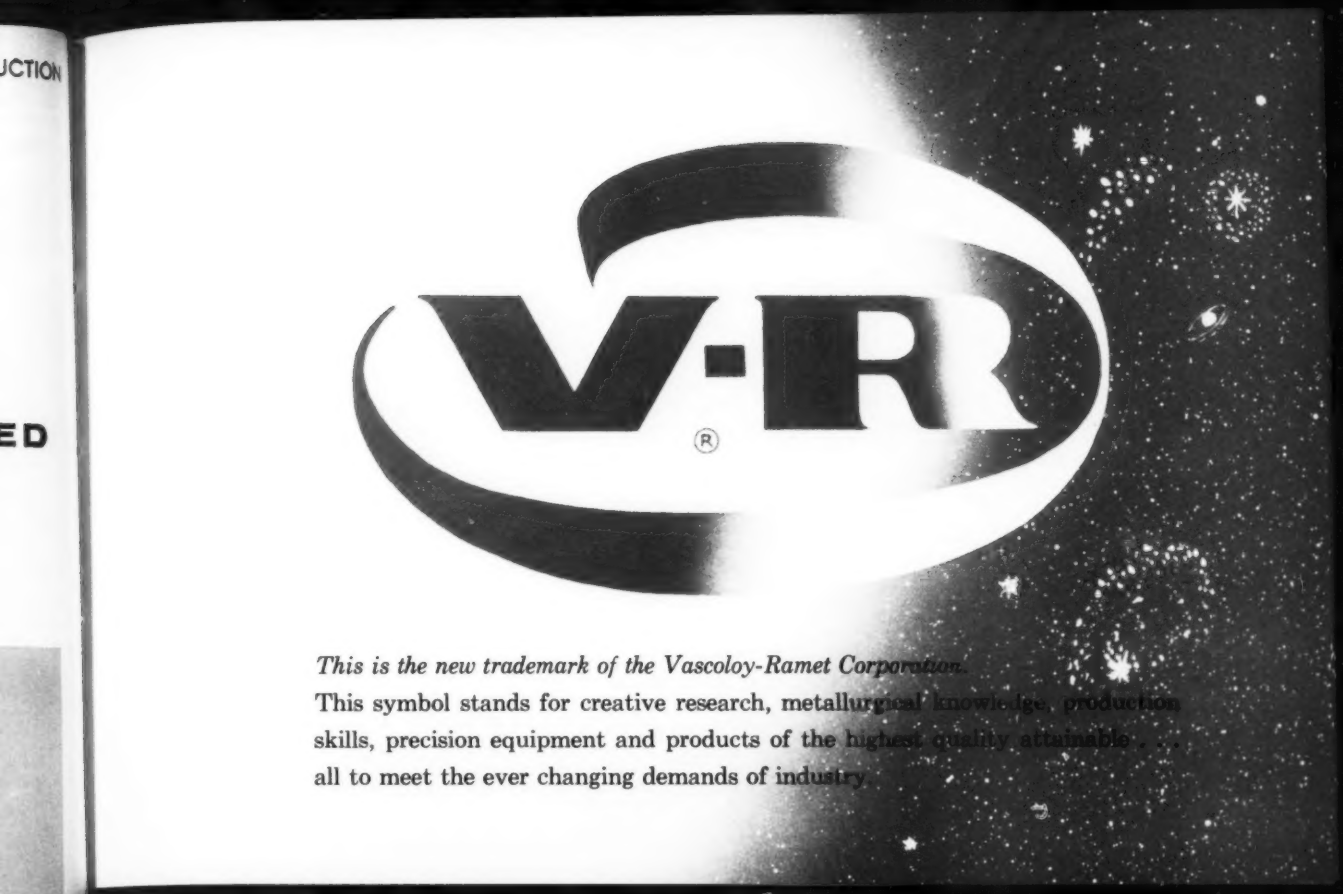
VISIT OUR BOOTH * '60 ASTE TOOL SHOW

Valvair AKRON 11, OHIO

Other INDUSTRIAL DIVISIONS of IBEC: The Sinclair-Collins Valve Co. The Bellows Co., Akron, Ohio • V. D. Anderson Co., Cleveland, Ohio.

CIRCLE INFORM-A-GRAM KEY NO. 34

8110



This is the new trademark of the Vascoloy-Ramet Corporation.
This symbol stands for creative research, metallurgical knowledge, production skills, precision equipment and products of the highest quality attainable . . . all to meet the ever changing demands of industry.

CREATING THE METALS
THAT SHAPE THE FUTURE

New metals for new needs through metallurgical research.

Years of research, experimentation and comprehensive testing have been devoted to every type of product being manufactured at V-R. By working closely with all types of industry, this metallurgical knowledge is effectively applied to meet industry's ever-changing demands for refractory metals. Whether you need better cutting tool materials . . . parts with greater resistance to heat, wear or corrosion . . . or intricate parts cast to close tolerances, then V-R research in refractory metals can be of help to you.

V-R VASCOLOY-RAM

CREATING THE METALS
THAT SHAPE THE FUTURE

Quality starts with purity

There's no secret to producing quality products at V-R. It's a simple matter of starting with highest purity raw materials and maintaining this purity and uniformity throughout all production processes.

A good example of V-R's quality control is this X-Ray Fluorescent Spectrograph which tells the exact composition and amount of each component in the material being tested . . . assuring purity of raw materials and uniformity of powdered metal compositions.

V-R VASCOLOY-RAMET

CREATING THE METALS
THAT SHAPE THE FUTURE

Constant checking assures consistent carbide performance

The consistent performance of V-R carbide is largely due to the varied and frequent quality checks at every step of the production process. Here, we see a metallograph being used to check grain structure and absence of porosity against rigid standards. Similar checks are constantly made to assure proper hardness, density and transverse rupture strength. This elaborate checking system assures that each piece of a specific V-R grade will always perform the same.

V-R VASCOLOY-RAME

CREATING THE METALS
THAT SHAPE THE FUTURE

Precision equipment assures accurate shapes and sizes

No single method can produce all the sizes and shapes of products manufactured at V-R. For example, that's why five different pressing methods are used to meet industry's carbide needs. The press shown here is typical of modern accurate equipment used to compact carbide at V-R. Regardless of the method used, precision controls and the knowledge gained through long experience enable V-R to form metals to accurate dimensional requirements and proper density.

V-R VASCOLOY-RAMET

CREATING THE METALS
THAT SHAPE THE FUTURE

V-R vacuum sintering makes better cemented carbides

Vacuum sintered carbide grades are more versatile because precise control during vacuum sintering removes trace impurities . . . increasing the strength of V-R carbides and their ability to withstand cutting conditions which generate extreme heat. Vacuum sintering is one of the many reasons for the superior performance of V-R's new carbide grades for machining all types of steel and the new superalloys.

V-R VASCOLOY-RAMET

CREATING THE METALS
THAT SHAPE THE FUTURE

Finishing to customers' specifications

V-R from the first recognized industry's need for finished products ready for immediate use. People and equipment were then geared to manufacturing products to meet the varied specifications of industry. Thus, whether you use V-R metals in the form of blanks, inserts, brazed tools, wear parts, coal and rock bits or any of numerous other forms, you will find that V-R has the equipment and knowhow to fulfill your requirements.

V-R VASCOLOY-RAMET

V-R

CREATING THE METALS THAT SHAPE THE FUTURE

Metals that shape the future take many forms . . . *cutting tools* for all types of machining operations . . . *parts* designed for extreme resistance to heat, wear and corrosion . . . *mining bits* for increasing coal production . . . *percussion bits* for helping build turnpikes, dams and tunnels . . . *metals cast* to close tolerances eliminating costly machining operations . . . but, regardless of the form they take, all V-R refractory metals are playing an important role in shaping a better future.

V-R CARBIDE

V-R CARBIDE is produced in a wide range of grades, each with different characteristics for specific uses. Available in all types of blanks, inserts and brazed tools for machining . . . balls, discs, rods, tubes, special shapes and parts that resist heat, wear and corrosion . . . a complete range of coal mining bits and percussion bits.

V-R TANTUNG

V-R TANTUNG is an exclusive cast alloy with high red-hardness, high transverse rupture strength, high shock resistance and low coefficient of friction. Widely used as solid tool bits, cut-off blades, cast-to-form shapes and tipped tools. Also, Tantung, because of its characteristics, is one of the more popular V-R metals used for investment casting of small, intricate parts.

V-R CERAMIC VR-97

V-R CERAMIC VR-97 is an entirely new aluminum oxide cutting material for ultra-high speed machining. It outperforms all other ceramics. Proven in continuous production, it provides a better finish, better size control and a longer tool life with speed flexibility.

VASCOLOY-RAMET

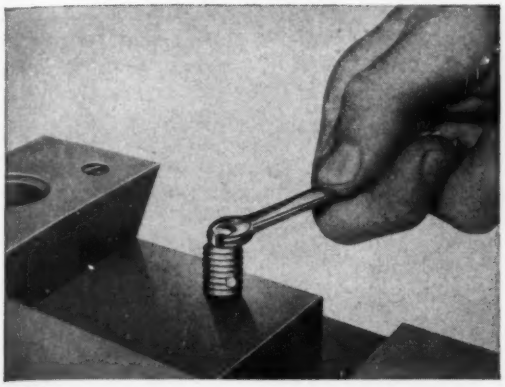
800 MARKET STREET • WAUKEGAN, ILLINOIS

A-779

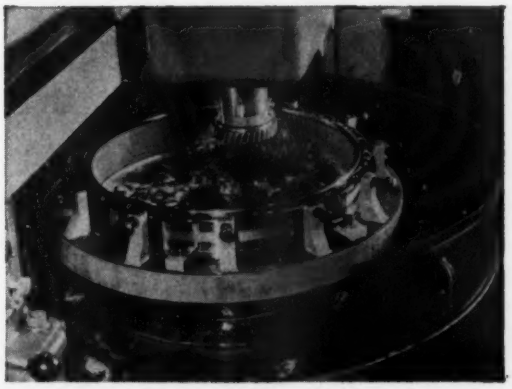
Practical Tooling Tips

No. 4 of a series

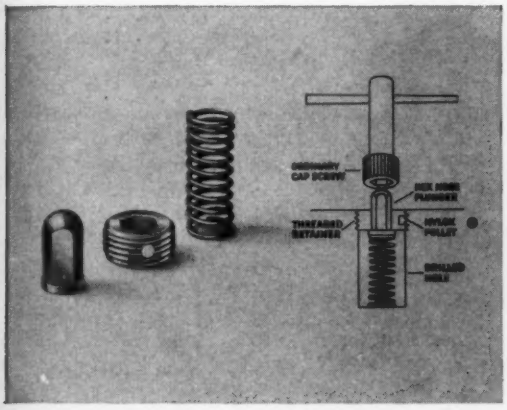
New uses are being found every day for Vlier Tooling Accessories. Perhaps the applications shown below will suggest ways you can profit by replacing costly, custom devices in jigs, dies and fixtures with precision, off-the-shelf Vlier products.



HEX NOSE SPEEDS INSTALLATION OF SPRING PLUNGERS—Vlier Hexnose Spring Plungers are easily installed with a simple end wrench. Eliminates hunting for special wrenches. Made to same exacting tolerances as Vlier Standard Spring Plungers. Available in many end pressures, diameters and lengths.



THIN-WALLED RING GEAR HELD SECURELY in fixture without distortion with 12 Vlier Torque Thumb Screws. Once pre-set end pressure is reached, knurled head spins freely, preventing overtightening. Checknut prevents backing off under vibration. Available in four types; various screw diameters and lengths.



NEW PLUNGER ASSEMBLY PREVENTS DAMAGE TO DIE STOPS—Plunger actuates automatic stop perfectly. Quickly installed, never needs adjustment. Hex nose mates with standard hex head bolts for easy insertion. Nylok® nylon pellet prevents threaded retainer from working loose. 6 sizes from ¼" to 1" diameter. Various end pressures.

FREE IDEA BOOKLET—Illustrations in this 16-page booklet show how others have profited from the use of Vlier Tooling Accessories. Shows both the usual and unusual applications. May suggest ways *you* can save. Write for your copy today.

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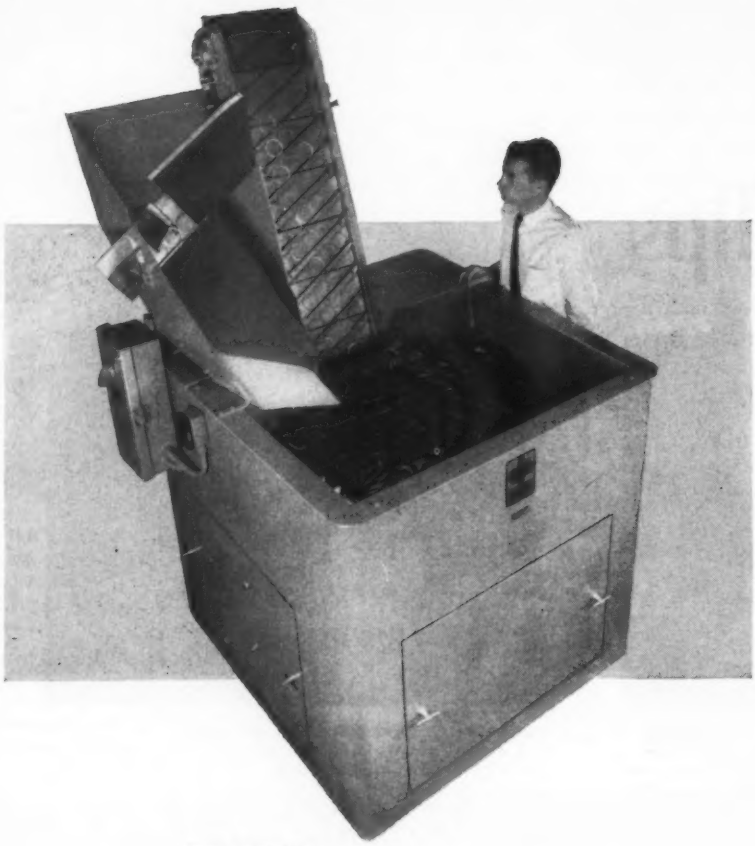
CIRCLE INFORM-A-GRAM KEY NO. 43



How DPS elevating feeders elevate, orient, feed your parts to cut production costs

New elevating feeders from Detroit Power Screwdriver Company—

- Eliminate hand feeding
- Permit high-speed feeding and orienting
- Discharge parts at height to suit your requirements
- Offer adequate holding capacity

The output of hand-fed production machinery soars with DPS elevating feeders. Parts of almost any size, shape and material can be fed quickly, gently, in a continuous flow to other machinery for processing and assembly.

Three standard sizes available: 6, 12 and 20 cu. ft. holding capacities. Larger or smaller units can be fabricated to meet special requirements.

NEW BULLETIN
. . . has complete information on new DPS elevating feeders. Mail the coupon today!

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2827 W. Fort St., Detroit 16, Michigan
Send new Elevating Feeder Folder 2812.

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FIRM_____
ADDRESS_____

CIRCLE INFORM-A-GRAM KEY NO. 44

MEN YOU SHOULD KNOW

Otto J. Manse was recently named manager of manufacturing at Rollway Bearing Co.

Newly appointed manager of operations of The Sheffield Corp's Product Divisions is **Louis Polk, Jr.** He also continues as assistant vice president and manager of the Instruments and Systems Division, and director of domestic and Canadian service plants.

The appointment of **Orval A. Opperthauser** as chief engineer at F. Jos. Lamb Co. was made known recently.

Newly appointed division manager **William E. Brandt** heads the recently established Vibratory Finishing Division of Pangborn Corp.

The Warner & Swasey Co. has promoted **Howard W. Geyer** from director of quality control to general superintendent at the Cleveland plant, **Peter Rusnov** from manager of methods to chief industrial engineer, and **Lad J. Bayer** to general manager, Control Instrument Division.

Taking over as chief tool engineer at Baird Machine Co. is **C. P. Foreman.**

Now serving as works manager for George Gorton Machine Co. is **Eugene J. Anspach.**

Appointment of **E. C. Shawe** as plant manager of the Chrysler Corp's St. Louis Assembly Plant, and **A. P. Podges** as director of quality control, Car and Truck Assembly Group, have been made known.

T. Kenneth McGuire, vice president and general manager of a subsidiary, DeVilbiss Metal Fabricators Co., has been elected vice president of The DeVilbiss Co.

Louis S. Oosten is now vice president in charge of engineering for Bell & Gossett Co.

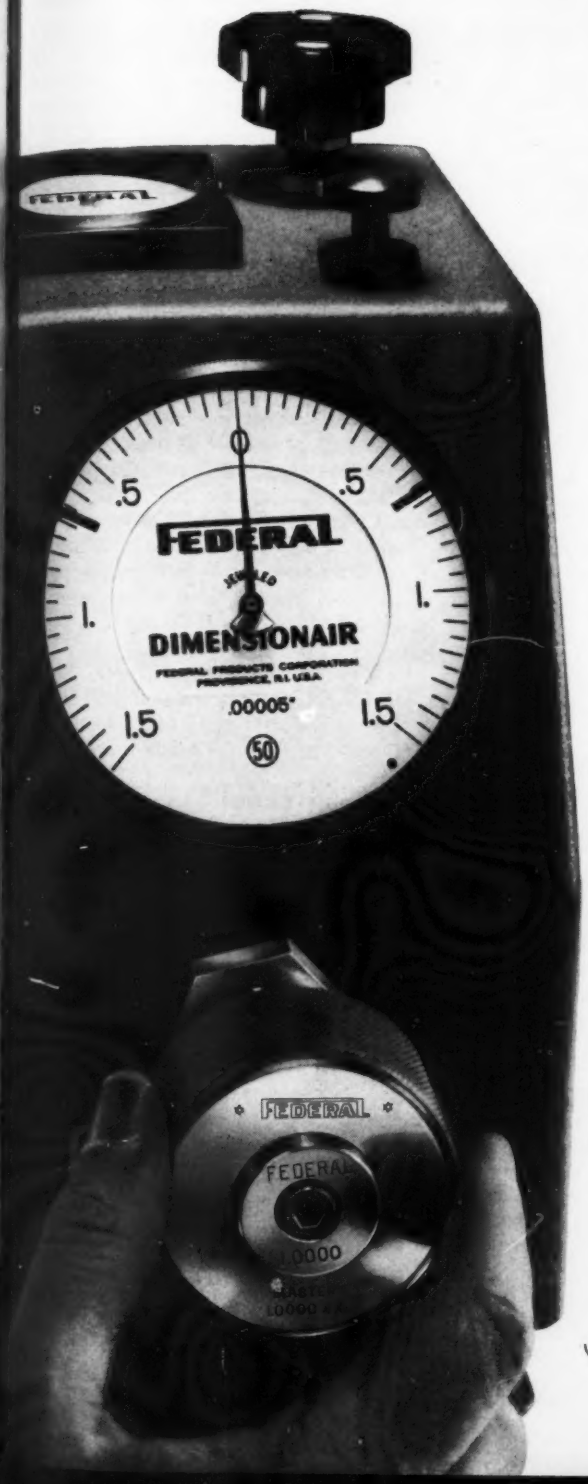
. . . **Continued on page 46**

CIRCLE INFORM-A-GRAM KEY NO. 45→

NO DOUBT ABOUT IT...

that's why the DIMENSIONAIR

is the best air gage you can buy!



No doubt about the Dimensionair's readings

Such sharply defined calibration — the mark of a truly accurate gage — obviously gives you greater resolution, much finer readings than broadly defined graduations and wide hands or air-suspended markers ever can. Each time you gage with the Dimensionair, the needle-thin indicating hand advances smoothly, comes to a positive stop, yet is responsive to the slightest change. Its position in relation to the fine-line graduations is unmistakable. Such decisiveness, coupled with Dimensionair sensitivity, means much greater readability. In fact, tests prove that you get more information from the Dimensionair than from other air gages having *twice* the magnification.

No doubt that the Dimensionair maintains its accuracy

Dimensionair magnification is built-in . . . fixed. No adjustment can change it. That's why the Dimensionair, once set, *stays* set. Air pressure variations cannot affect the accuracy of the Dimensionair. Its balanced air circuit cancels them out. This achieves a stability which cannot be approached by other air gages.

No doubt the Dimensionair is easiest to use

Its fixed calibration and protection against drift guarantees *linear, calibrated* accuracy so you need only *one* master for set-up . . . make only *one* adjustment to set zero. You're ready to gage in less than ten seconds . . . no juggling high and low limits as with other air gages. Dimensionair design gives you wide range operation (up to .006″ depending on model selected).*

All these advantages are yours because the Dimensionair, unlike other air gages, is *built* to a specific accuracy and magnification. But don't just take our word for it . . . see for yourself. We shall be glad to demonstrate the Dimensionair to you.

*FIVE MAGNIFICATIONS TO CHOOSE FROM:

1,250:1 (.006″ range, each grad. = .0001″)
2,500:1 (.003″ range, each grad. = .00005″)
5,000:1 (.0015″ range, each grad. = .00002″)
10,000:1 (.0006″ range, each grad. = .00001″)
20,000:1 (.0003″ range, each grad. = .000005″)

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6234 Eddy Street • Providence 1, R.I.

VISIT OUR BOOTH
DETROIT * '60 APRIL 21-28
ASTE TOOL SHOW

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BOOTH 1000

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FOR RECOMMENDATIONS IN MODERN GAGES . . .

Dial Indicating, Air, Electric, or Electronic — for Inspecting, Measuring, Sorting, or Automation Gaging

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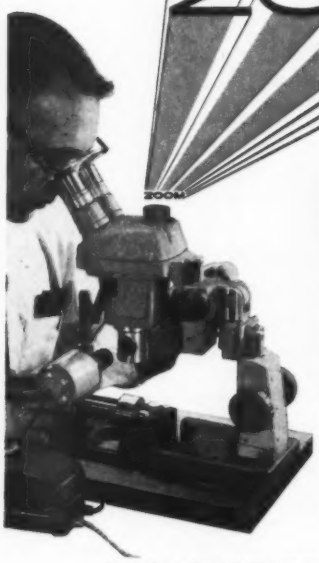
ZOOM



NEW STEREOZOOM* MICROSCOPES BY BAUSCH & LOMB!

Breaking all sales records! Just try one in a free shop demonstration and you'll soon see why . . . they're the newest step forward to faster and easier 3D work.

EXCLUSIVE NEW OPTICS!

Get StereoZoom...continuously variable power! Just a turn of the knob gives an infinite choice of magnifications throughout the whole stereo range . . . to 120× on some models.

EXCLUSIVE NEW POWER POD DESIGN!

A wholly enclosed optical system in a single unit. Keeps out dust and dirt; eliminates old fashioned nosepieces, annoying image jump and blackout. NEW VERSATILITY, TOO! Your choice of StereoZoom or fixed power in a Power Pod that interchanges among any of five basic stands.

NEW LOW PRICE! About ⅓ lower than previous line.

*Trademark, Bausch & Lomb Optical Co.

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BAUSCH & LOMB OPTICAL CO.
77304 Bausch St., Rochester 2, N. Y.

☐ Send me new B&L StereoZoom Catalog D-15.
☐ Schedule a demonstration at my convenience.

Name, Title.....
Company.....
Address.....
City..... *Zone*..... *State*.....

Visit B & L Booth #630, A.S.T.E. Tool Show, April 21-28, Detroit, Michigan
CIRCLE INFORM-A-GRAM KEY NO. 46

. . . Men from page 44

Five promotions in the Curtis Machine Division of The Carborundum Co. include: **Richard D. Rutt,** production manager; **Paul W. Joy,** manager of the technical branch; **Adolph C. Carlson,** manager of the machine design department; **William C. Keyes,** senior design engineer; and **Francis M. Owrey,** senior quality control engineer.

Lowell A. Kinigh, assistant chief engineer at Oldsmobile, was recently named chief engineer at Buick Motor Division of General Motors. He succeeds **Oliver K. Kelley,** who was named technical assistant to the general manager of the newly-created Defense Systems Division.

Illinois Tool Works has announced these executive promotions: **Silas S. Cathcart** was elected vice president for corporate planning. He also serves as administrative assistant to the executive vice president. **James D. Norman** is the new manager of Fastex Division.

Charles D. Bradrick has been appointed production superintendent for Raytheon Co.'s Semiconductor Division plant, now under construction.

The appointment of **James W. Hatch** as general manager of the Downey, Calif., plant of Ex-Cell-O Corp. was recently made known.

George F. Topinka is serving as chief engineer of the Power Cylinder Division of Hannifin Co.

William Bournais has been named chief engineer of Buhr Machine Tool Co.

Northwestern Electric Co. has announced the election of **Wilson J. Smith** as vice president of manufacturing.

Dana Corp. has announced the following changes: **R. E. Fletcher** is chief engineer, with assistant chief engineers **Norman Revenaugh** (production engineering) and **Louis Stuckey** (advanced engineering). **John A. Kayser** takes over as chief engineer of Universal Joint Division, and **James Lyons,** assistant chief engineer.

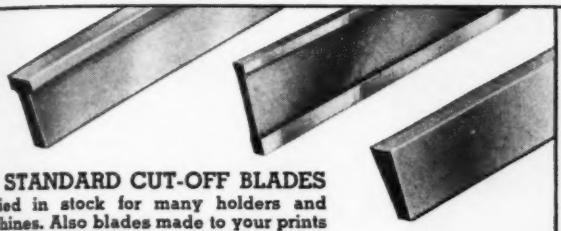
O-KNI-CO MACHINE TOOL news

PRODUCTION FACTS THAT INCREASE YOUR PROFITS

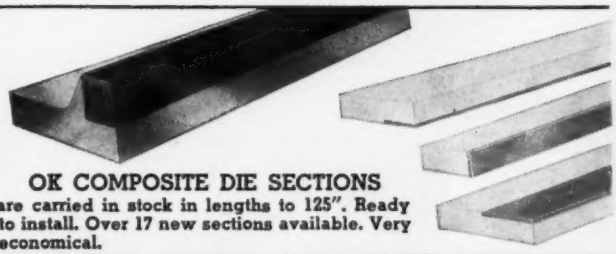
PUBLISHED BY THE OHIO KNIFE CO., CINCINNATI, OHIO

MANY COMPANIES NOW CUTTING PRODUCTION COSTS — INCREASING MACHINE LIFE AND ACCURACY WITH THESE OHIO KNIFE CO. HARDENED PRODUCTS

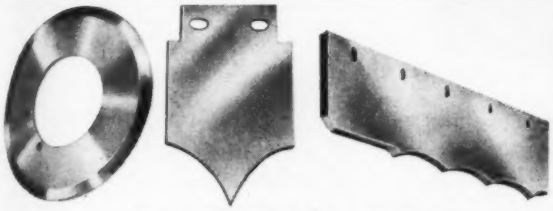
The products shown here are just a few of hundreds made by The Ohio Knife Co. of Cincinnati, Ohio. They are widely used as components by machine builders and as replacements when ordinary parts wear or break. The Knife Co. is internationally famous for their special hardening techniques, resulting in a reputation for producing products with long wear qualities. Many products are made by bonding high speed steel, tool steel or alloy steel to a mild backing. This gives the finest wear resistant surface possible. Perfect bonding is assured through use of a 2,500 ton forging press and rolling mill. Other products are especially hardened to meet the requirements of the job. All products are meticulously ground to extremely close tolerances. Specific bulletins are available FREE on all products.



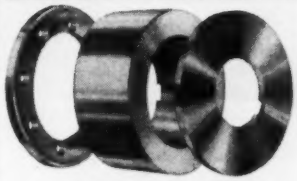
OK STANDARD CUT-OFF BLADES
carried in stock for many holders and machines. Also blades made to your prints or specifications.



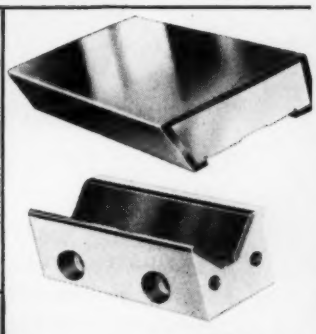
OK COMPOSITE DIE SECTIONS
are carried in stock in lengths to 125". Ready to install. Over 17 new sections available. Very economical.

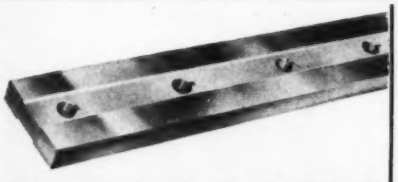


OK TUBE CUT-OFF BLADES
widely used in the manufacture of welded tubes.

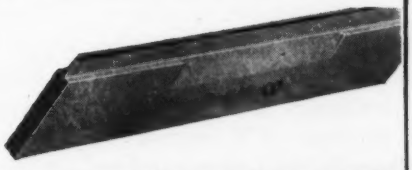


OK ROTARY METAL SLITTING KNIVES AND SPACERS
in a complete range of sizes.

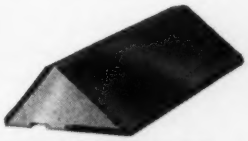




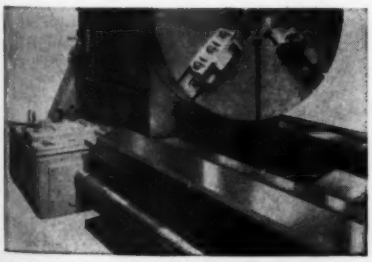
OK SOLID STEEL SHEAR BLADES
for all types shears and any type of shearing requirement.



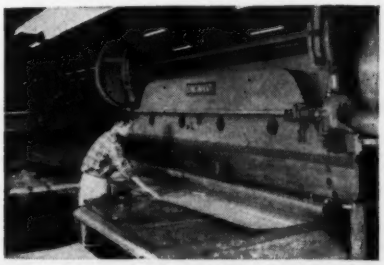
OK CENTERLESS GRINDER BLADES
Complete range of sizes and designs carried in stock for quick delivery.



OK WAYS—GIBS
are practically wear-proof. Also available in aluminum bronze. Complete selection



O-KNI-CO processed hardened ways on 60 inch lathe made by The Niles Tool Works.



65 ton Cincinnati Press Brake equipped with long-wearing O-KNI-CO processed shear blades.

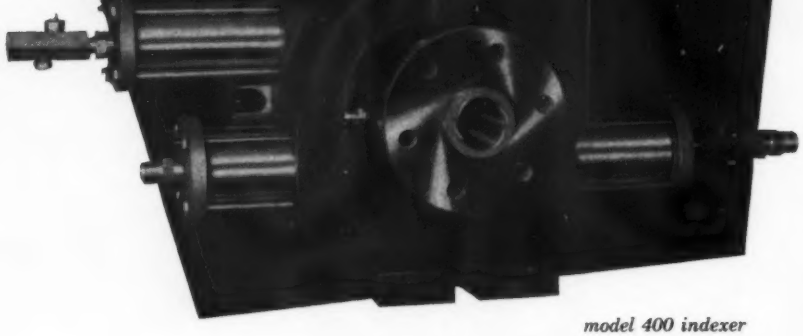
O-KNI-CO hardened bedways, cross ways on a G. A. Gray Co. horizontal boring machine.

FREE BULLETINS AVAILABLE • THE OHIO KNIFE CO., DEPT. 110-LL • CINCINNATI 23, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 47

For speeding precision production

AUTOMATE *with* *Erickson Indexers*

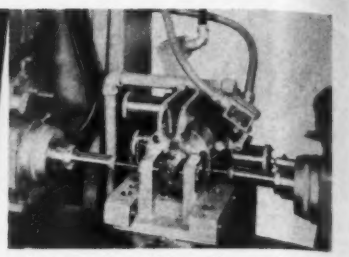


model 400 indexer

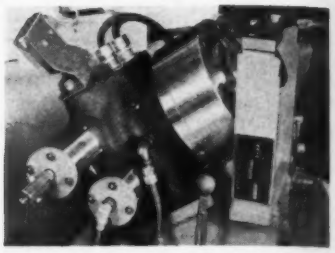
Perhaps these actual applications of automation will trigger your imagination . . . show you how Erickson Indexers can help you smash bottlenecks in your own production operation.

You can interlock them into production setups with microswitches and solenoid valves. And with Erickson Indexers you automatically get consistent positive positioning within 2 minutes of a degree . . . repetitive accuracy in low "tenths" of a thousandth.

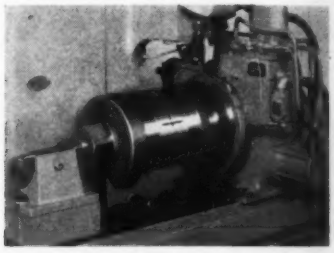
Speed to keep lines humming . . . accuracy to banish rejects . . . long life to slash maintenance and capital investment—all add up to Erickson Indexers. A-1562A



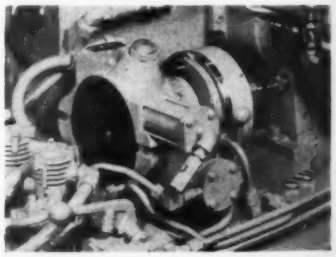
Automatic drilling of cross holes being done on Erickson Model 400 Speed Indexer with air cylinder and Expanding Drawbar Mandrel. Indexer equipped with interlock limit switches.



Angular drilling in jet part held in air operated collet chuck on Erickson indexer operating automatically. Entire fixture designed and built by Erickson.



Using end-clamping for half bearing, machine mills 8 oil grooves then skip indexes back to starting position for next part.



Milling four and six flats on needle valve part. Owing to size, part is placed in tail stock head-first, and tail stock then positions it in chuck and retracts.

ERICKSON TOOL COMPANY

34551-4 SOLON ROAD • SOLON, OHIO

COLLET CHUCKS • EXPANDING MANDRELS • AIR-OPERATED CHUCKS • FLOATING HOLDERS • TAP CHUCKS
• AUTOMATIC INDEXING • MASTER SPACERS • DIAPHRAGM CHUCKS • PUSH-ON ARBORS • QUICK-CHANGE HOLDERS
• EXPANDING COLLETS • END-CLAMPING CHUCKS • AIR CYLINDERS (allowing stock to pass through)
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• BORING BARS • SPADE DRILLS • RECESSING TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 48

We Welcome the

MANUFACTURING ENGINEERING COUNCIL

and offer an idea . . .

OUR BEST WISHES are extended to the founders of the Manufacturing Engineering Council. This marks the beginning of a national group whose activities will be devoted exclusively to the interests and problems of manufacturing engineering, and whose membership will be sought from the ranks of both engineering and management.

The new organization stems from the efforts of a committee formed at the Second Conference on Manufacturing Automation held in March 1959 at Purdue University. At the final meeting of the Conference feelings were expressed by a number of participants of the need for a society devoted exclusively to the interests of the manufacturing engineer and manufacturing automation problems.

Subsequent organizing committee meetings in Cleveland and Chicago further substantiated the need for such a society. Accordingly, a constitution and by-laws were drawn up, and chartering and incorporation proceedings as a non-profit organization were carried out under the laws of the state of Michigan.

Consequently, the first official meeting of the Manufacturing Engineering Council will take place during the Third Conference on Manufacturing Automation which will be held at Purdue University in Lafayette, Indiana, later this month—the 11th through 13th. During this meeting a national slate of officers and directors will be elected, and charters will be issued to local chapters about the country. The policies and objectives of the organization will be fully discussed and formulated.

Right here and now, this editor would like to propose to the Council the establishment of a committee to study and analyze the caliber of manufacturing engineering evidenced in competitive imports. The findings from such a study could well provide technological ammunition to domestic manufacturers in meeting foreign competition, and serve as a continuing spur toward equipment and methods modernization on the domestic front.

Such an effort, supported and/or under-written by a given segment of industry, be it toys or machine tools, electronics or plumbing fixtures, could be productive of a wealth of know-how—how the competition is doing what it's doing.

Case histories could be compiled in the area of our depreciation regulations, direct labor vs automation, stampings vs die castings vs plastics, printed circuitry, to say nothing of machine and tool capability and productivity, serviceability and distribution.

The timing for exploring these influences on our domestic economy would seem ideal for the MEC, with no commitments, no unfinished projects, a clean slate, and unbounded enthusiasm and skills to draw on. All this, at a time when foreign competition is appearing in more and more of our marketing channels.

The number of domestic manufacturers who have acquired foreign affiliates and subsidiaries is increasing daily. Access is thus gained to many ramifications of foreign manufacturing engineering. We feel that a tremendous service could be performed by the MEC in fostering the feedback and dissemination of foreign techniques.

Why not call a spade a spade? The way foreign competition is ballooning in our domestic and world markets, we're simply going to have to fight fire with fire. There's no place in metalworking for tranquilizers. Both labor and management have a lot to learn from the foreign modus operandi. A little "running scared" will do us no harm.

We will say that the MEC shapes up as an opportunity for you to assume an important role in a new and vital communications network being extended thruout industry.

Inquiries concerning information and membership in the Manufacturing Engineering Council are invited and should be addressed to the acting Chairman, Frederick I. Ellin, Chief Production Engineer, Ohmite Manufacturing Company, 3601 Howard Street, Skokie, Illinois, or to acting Vice Chairman, Michael Zajac, Buhr Machine Tool Company, 839 Green Street, Ann Arbor, Michigan.

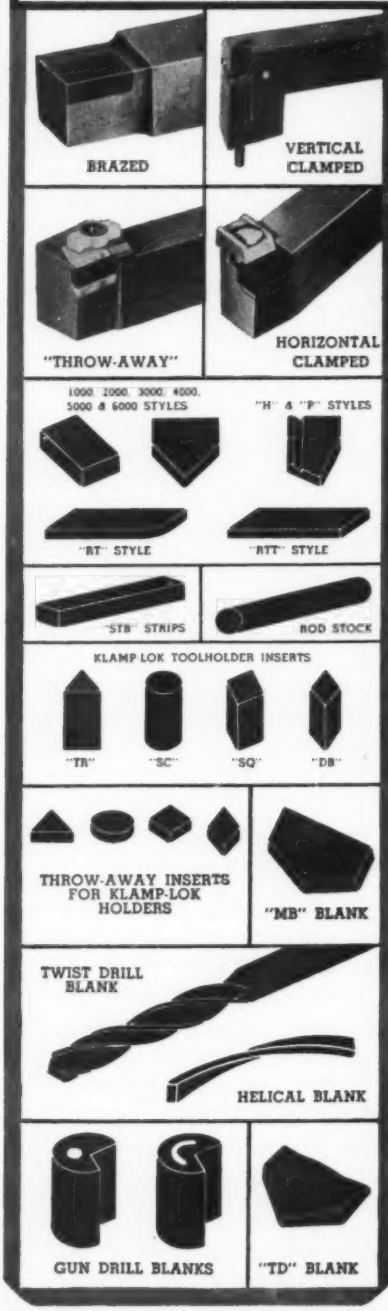
Again we say, our congratulations and best wishes to the Manufacturing Engineering Council.

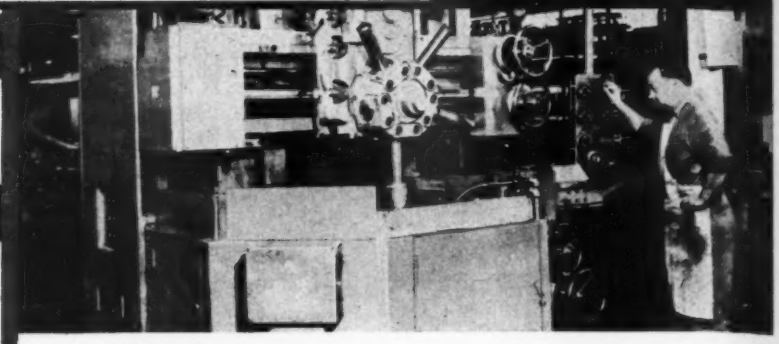
E. Willard Pennington

Editor

. . . ANOTHER TALIDE CASE HISTORY

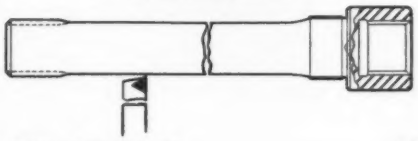
TALIDE TOOLS Produce 50% More at J.I.CASE



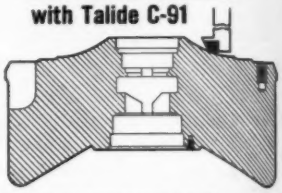


J.I.CASE® Co., Racine, Wisconsin, leading manufacturer of Agricultural and Industrial Equipment, reports Talide Tools give superior performance on both cast iron and steel jobs.

18 Shafts machined with Talide S-92



600 Wheels machined with Talide C-91



Main drive shaft 15/16" dia. x 16-15/32" long	Part	Rear tractor wheel 15" dia. x 7-19/32" thick
H.R. A-8640 steel 285-321 Brinell	Material	Hi-nickel cast iron SAE111
Turn O.D. of Shaft	Operation	Face outer edge of wheel hub, 1/2" wide cut
Carbo-matic	Machine	Bullard
#TN-163P3 Talide Disposable insert 1/2" I.C. x 3/16" thick, negative angle, 3/64" corner radii, Grade S-92	Tools	#GL-20 brazed tool, off-set style, 1-1/4" x 1-1/4" x 8" shank size, Grade C-91
1/16"	Depth of Cut	1/8" to 1/2"
.009	Feed	.033
115	Speed (S.F.M.)	210
450	(R.P.M.)	39
Soluble Oil	Coolant	dry
Talide Grade S-92 Machined 18 shafts per grind. Next best premium grade produced only 12 shafts.	Results	Talide Grade C-91 Machined 600 wheels per grind compared to 400 for next best premium grade.

HERE'S OUR OFFER!

Our Service Engineers will furnish and test a Talide Tool on any job you designate—free of charge. Write for Catalog 59-G. Metal Carbides Corporation, 6001 Southern Blvd., Youngstown 12, Ohio.

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HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

CIRCLE INFORM-A-GRAM KEY NO. 50

Think First of

Cut-Rate Tooling and Methods

For optimum production economy, keep your tooling expense commensurate to class of work. Here are several "thought-starters" for those daily run-of-the-mill jobs.

by Clement F. Brown

A DANGER EXISTS when the tool engineer's thinking becomes permanently clouded with the concept of high precision tooling. He finds it difficult to come down-to-earth to cope with the daily problems of run-of-the-mill parts involving looser-tolerances and job-shop production quantities. Costs can run rampant in areas of work that do not warrant high expenditures for jigs, fixtures, gages, and other tooling.

What constitutes an ideal design? The answer is: One that results in a product, part, or tool just good enough to fulfill its intended function. Unnecessary embellishment wastes time and money; on the other hand, inadequacy is expensive. Perfection is seldom attained; most tools—often designed against the press of time— can, after a brief trial, be improved in some way. It's better to go beyond rather than fall short, but the ideal should, in each instance, be the desired goal.

Tooling's prime purpose is to produce parts at the lowest possible cost. This aim may be achieved in several ways. Let's look at the possibilities.

1. Direct Reduction of Production Time. Tools that enable workers to perform operations in less time will pay for themselves at a calculated break-even point and then begin to effect savings. This break-even point can be expressed by the formula:

Tool Cost = (Untooled Unit Cost − Tooled Unit Cost) X No. Pcs. Low quantity production is usually compatible with low-cost tooling, while mass production and expensive tooling often go hand-in-hand, other factors being equal.

2. Reduction of Required Manpower. In certain classes of work the operator may require a helper. Jigs and fixtures that eliminate this helper (reducing total man-hours, even though elapsed time may be increased) pay for themselves in a short time.

3. Skill Transferred to Lower Class Labor. Many tools enable a semi-skilled man, or helper, to do a job formerly requiring a first-class mechanic. The lower wage rate often effects a substantial savings, and where a skilled labor shortage exists tooling alone may alleviate it.

4. Increased Product Uniformity and Quality. Without directly reducing operation costs at the point of use, tooling may effect other savings. Part uniformity leads to interchangeability, eliminates selective assembly, and results in decreased assembly costs.

Now, Case Histories

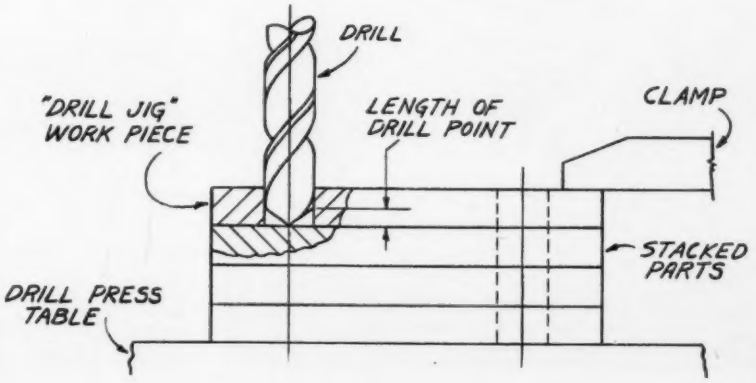
Drilling is the most frequently used machining operation—most parts contain holes. One prominent machine tool manufacturer estimates that about 20% of our machine tools are drilling units of one type or another.

In some drilling, production parts can serve as tools, eliminating layout on identical parts. Certain classes of low-tolerance drilling, containing non-critical hole sizes and spacing, lend themselves to this approach, eliminating jigs and fixtures.

(Turn page . . .)

Clement F. Brown is a mechanical engineer with over 20 years' experience in tool and production engineering. A graduate of Drexel Institute of Technology, he is Production and Methods Engineer for the Downingtown Iron Works, Inc., Downingtown, Pa.

Fig. 1. Production part serves as drill jig.



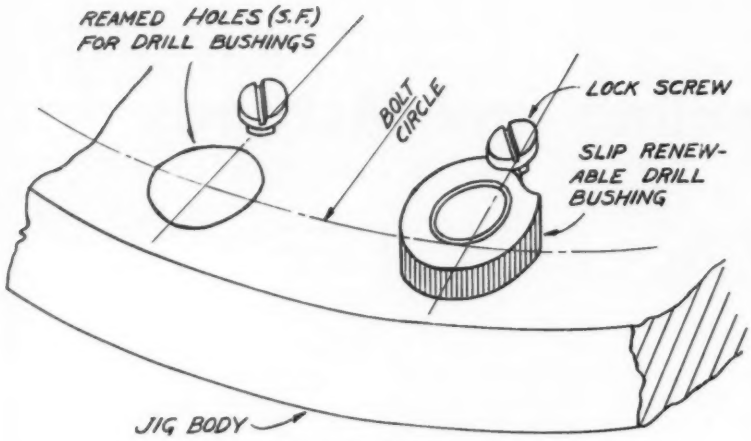


Fig. 2. "Cut-Rate" drill jig construction.

Regular Drill Jig

Using Headless, Press-Fit Bushings

(64)—1" Headless PF Bushings	@ $1.85 ea.	$118.40

Cut-Rate Drill Jig

Using Slip-Renewable Bushings in Reamed Holes (No Liners)

(4)—1" Slip-Renew. Bushings	@	$4.12 ea.	$16.48
(64)—#2 Lock Screws	@	.12 ea.	7.68
(1)—Std. Lock Screw Jig (Optional)	@	7.15 ea.	7.15
(Not a repetitive expense)			$ 31.31
Total Savings			$ 87.09

Fig. 3. Comparison of Costs of Two Construction Approaches.

To use this method of location, layout and centerpunch one workpiece only. Then stack drill a number of parts with this piece clamped on top. Drill subsequent stacks using the first piece as a "jig."

Naturally, such methods require precautions. Use the first piece only until it shows signs of wear, then use a second piece—preferably one from the initial stack. This insures reasonable uniformity for the balance of the run. Limit stacks to 4 or 6 pcs or heights approximately 4x the drill diameter. The "jig-part" thickness must always be slightly greater than the drill point's length to insure proper guidance with drill lip as the cut starts (Fig. 1).

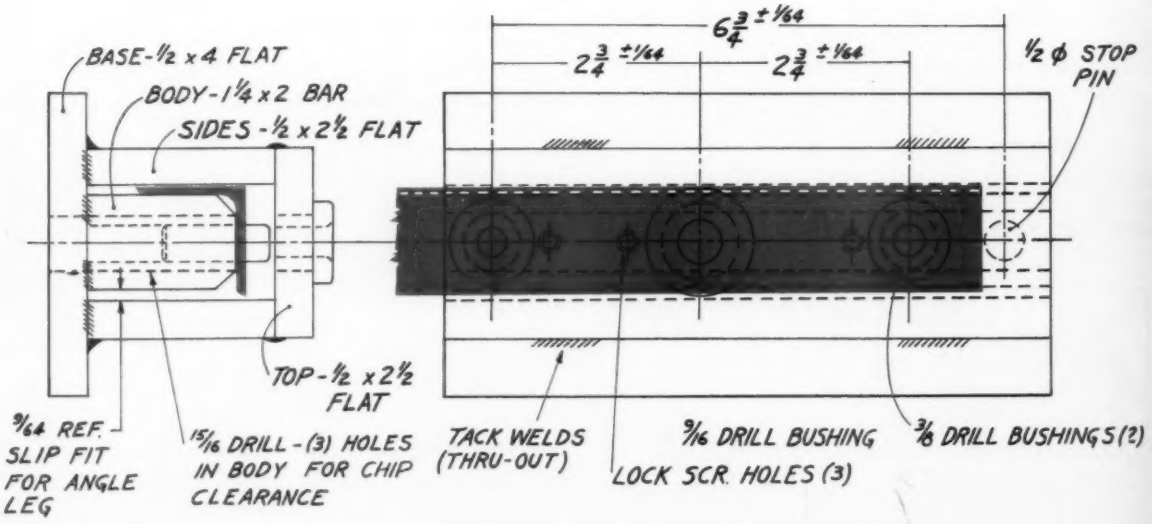
While this idea lends itself most readily to flat parts, other pieces, such as structural shapes, can sometimes be handled in the same manner. When hole layout combinations are symmetrical, angles and channels may be drilled "back to back." However, only one can be drilled at a time.

This method is not for high production, but where quantities are less than 300 pcs it should be considered.

Where More Are Needed

Work falling in the higher quantity category and/or requiring closer tolerances might be general purpose machine parts, where bolt

Fig. 4. Tack-welded box drill jig.


BASE-½ x 4 FLAT
BODY-1¼ x 2 BAR
SIDES-½ x 2½ FLAT
6¾ ±1/64
2¾ ±1/64
2¾ ±1/64
½ ϕ STOP PIN
TOP-½ x 2½ FLAT
9/64 REF. - SLIP FIT FOR ANGLE LEG
15/16 DRILL-(3) HOLES IN BODY FOR CHIP CLEARANCE
TACK WELDS (THRU-OUT)
9/16 DRILL BUSHING
LOCK SCR. HOLES (3)
3/8 DRILL BUSHINGS (2)

holes are to be drilled and tapped. This class of work includes holes that are equi-distant on a bolt-circle or straight line, where hole-to-hole dimensional errors are not cumulative.

Here, marked savings in drill bushing expense can be effected by departing from some of the usual tool design practices. See for example, the jig construction shown in Figure 2, where a circular part is to contain 64—1" holes.

Using a steel plate or ring for the jig body, locate by layout and centerpunch holes for slip fit bushings. Drill and ream all holes for a slip-fit for slip renewable bushing. The standard construction usually uses slip bushings in hardened liners, PF in reamed holes. Locate tapped holes for retaining screws at each hole. For closely spaced holes, a single lock screw will occasionally serve two bushings when set on a radius common to both. Using three or four drill bushings, move them as drilling progresses around the bolt-circle. One bushing can usually be moved to a new location during the drilling cycle—with no loss of productive time.

Figure 3 compares costs of purchased parts for the regular and suggested cut-rate methods of drill jig construction. Savings must take into consideration fabrication costs, but since both methods call for drilled and reamed bushing holes this cost is no factor. However, in some cases, drilled holes alone will suffice for the cut-rate construction. Final evaluation is based on the relative cost of press fitting individual bushings for each location (headless type) vs. drilling and tapping lock screw holes for cut-rate procedure. The big savings comes from a reduction in purchased parts.

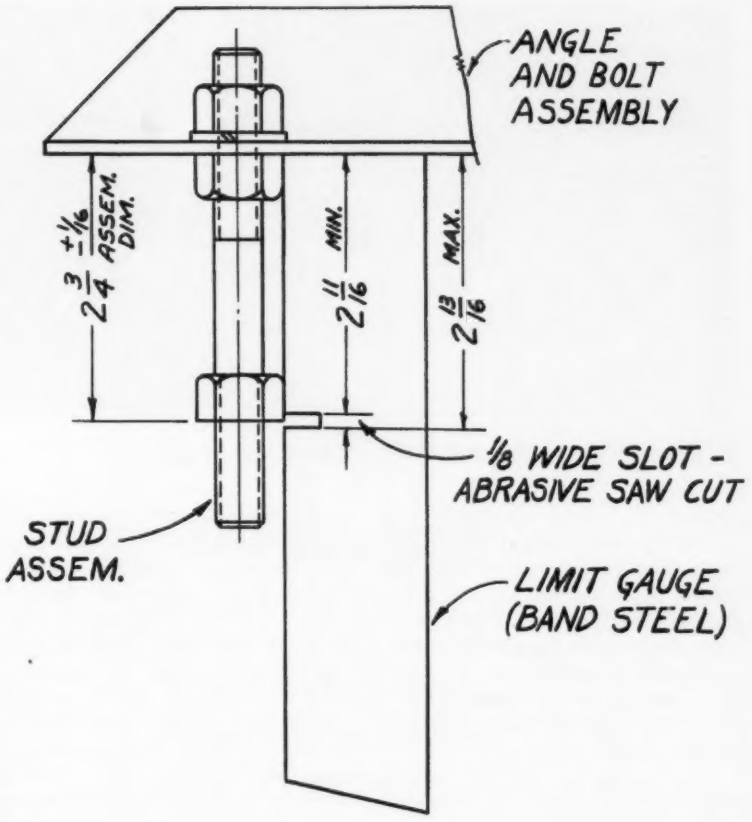

ANGLE AND BOLT ASSEMBLY
2 3/4 +1/16 ASSEM. DIM.
2 11/16 MIN.
2 13/16 MAX.
1/8 WIDE SLOT - ABRASIVE SAW CUT
STUD ASSEM.
LIMIT GAUGE (BAND STEEL)

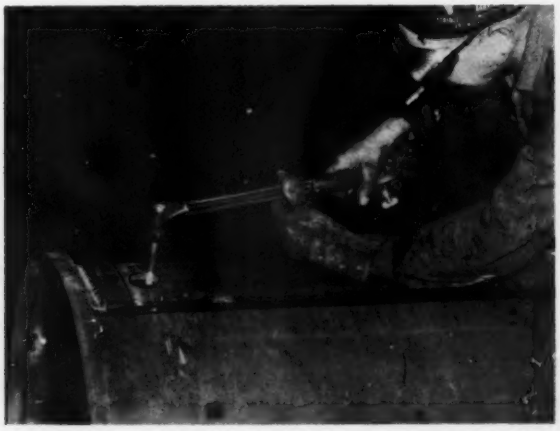
Fig. 5. Gage checks stud projection.

Box-Type Drill Jig

In another instance, an angle drilling operation features an inexpensive box-type drill jig. Work-

Fig. 6. Fixture for tank flame cutting and notch location.

Fig. 7. Fixture in place, operator cuts coupling hole.



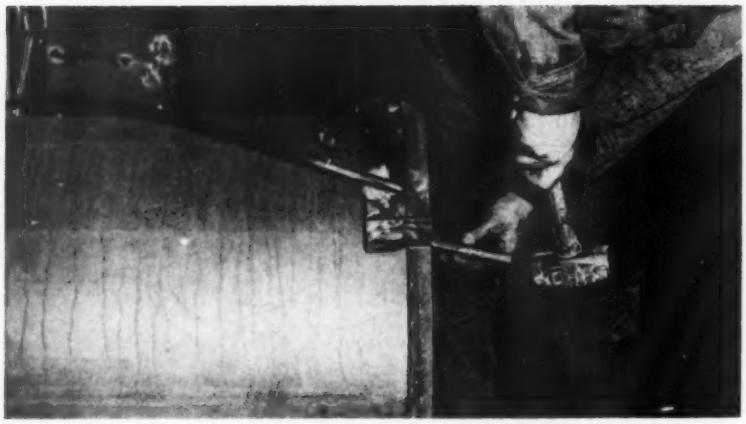


Fig. 8. V-notch is located and cut on rim of angle.

pieces were varied lengths of 1½" x 1½" x 1/8" stainless steel angle with holes drilled in both legs. The job lot contained 850 pcs, requiring 3400 drilling cycles. Three holes were drilled simultaneously in each leg, using a 3-spindle head. Angles were inserted into the jig and manually held against a stop pin while being drilled.

The welded jig used is shown in Figure 4. Cut-rate construction includes several definite deviations from regular practice. In addition to the absence of liners for the bushings, hot-rolled flats instead of cold-rolled steel are used as well as tack-welded construction in place of screws and dowels. All machine work except drilling and tapping is eliminated. Such deviation can be condoned only because of the nature of the part and wide tolerances but, where permissible, savings are appreciable.

For low-tolerance work, gages can sometimes be made economically from at-hand materials such as band steel. For instance, a certain assembly includes mounted studs. Stud projection requirements and an inexpensive limit gage are shown in Figure 5. During assembly, studs are tightened with a pneumatic impact wrench, and because of vibration it is advisable to check all projections—necessary because final assembly is done under adverse field conditions and even a few out-of-tolerance parts causes difficulty.

Make Fixture With the Part

It is normal practice to make jigs and fixtures before manufacturing starts. However, certain tools are more economically fabricated and assembled on the first production piece or pilot unit at little or no inconvenience.

To illustrate, let's examine a tool made for 50 welded tanks. The tanks, 29" dia and 39" high, contain only one hole in the bottom, from which another hole and a notch are located. The fixture's to guide the manual flame-cutting of the other hole in the tank's wall and to locate a V-notch on the rim.

The fixture shown in Figures 6-8, inclusive, consists of four parts: A formed bar containing the guide hole; a base plate drilled to locate from the tank's bottom hole; a formed bar to hold the block used to indicate the notch's location; and a bent brace. All parts were assembled by clamping in position and tack-welding, using the first tank as a "jig."

Irregularly shaped fixtures of this type are often difficult and expensive to build because of the lack of a flat plane of reference. When tolerances permit, they are less costly to produce in the manner described. The added work of first-production-piece layout entails little time, and even the bent brace can be formed and cut-to-suit in the shop at less expense than developing its length and contour in other ways.

The tool engineer would do well to pose the following questions when studying a new job: 1) Can the job be done economically without tooling? 2) If not, will low-cost elementary tooling suffice? 3) If not, will high-cost, elaborate tooling "pay its way"?

Use common sense, and don't hesitate to deviate from standard and accepted practices. While change does not guarantee progress, progress starts with change.

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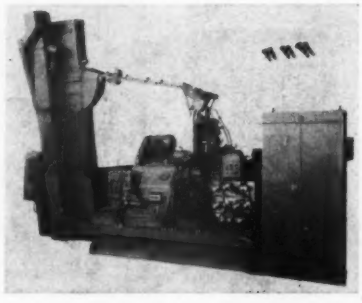
Pin Holes, Slots In Six Automatic Steps

Six quick, automatic steps to the finished product—that's the profile of a recently-designed horizontal index machine.

Davis & Thompson Co. developed the 6-station unit with hopper feed, arranged to drill and chamfer cotter pin holes, and mill screw driver slots in ball studs.

Two pieces are fed into the fixture at each index of the machine.



The sequence of operation is: automatic load at Sta. 1, countersink two pieces from both sides at Sta. 2, drill half way through from both sides at Sta. 3, drill through both pieces from one side and mill screwdriver slots in ends of piece at Sta. 4, probe to insure completion of hole at Sta. 5, and automatically eject at Sta. 6. Clamping is automatic at each work station.

by Donald H. Sunderlin

Executive Appraisal - -

A Trouble-Stopper And Profit-Maker

PROMINENT BUSINESS LEADERS have said that **men** are the most important of the "m's" — money, material, machinery, etc. required for the success of any enterprise. This obvious truism gives an indication of the value of having the right man in the right slot at the right time.

Whether the man is the right one is ascertained by executive appraisal. And whether the slot, or position, is right is determined by a study of policies, procedures, management controls, and organizational relationships. Because the right man cannot succeed when he is hamstrung by organizational deficiencies, a fair appraisal includes a review of the conditions under which he has to work. The right time may be either the present or some future period. Incumbents of important jobs must measure up to their current responsibilities, while trainees are expected to show promise that they will succeed in the positions for which they are being groomed.

Executive appraisal is two directional in that the appraiser must look **out** to see what the external influences are as well as **in** to learn whether the appraisee would be effective in an ideal job situation. This dual view answers three pressing questions which often confront top executives:

1. Do our unsatisfactory results stem from incompetence on John Doe's part?
2. If they do, what is required to bring Doe up to par?
3. If they do not, what organizational or administrative changes must management make for anyone in Doe's position to fulfill expectations?

An executive's performance is quite easily appraised when objective measurements can be used. These include budgets, production schedules, sales quotas, labor turnover, and similar standards. Except for the larger companies, however, these yardsticks are not always available and meaningful. Then, the appraisal depends on opinions formed by judgment.

In every case, both kinds of measurement are used in an effort to make the appraisal as concrete as possible.

Inquiries and Job Study

The executive is interviewed in depth to learn his opinion of his performance on the job, and his superior is likewise interviewed. The differences disclosed are then explored to learn what the facts of the case really are. A study of the job itself is made to ensure that barriers to effective operation are

Mr. Sunderlin, managing partner of Sunderlin Organization, a consulting group headquartered in Cleveland, is a frequent contributor to Tooling & Production. Popular in recent years have been his articles, "Executive Development Prerequisites," "Distribute the Management Load: Delegate Responsibility," "The Emergence of the Professional Executive," and "Organization, the Key to Profits."

not inherent in the working conditions.

The climate in which the interview is held should be one in which he feels free to express his feelings. He talks without restraint either when he knows his position is in jeopardy or when he is approached regarding a general problem with which he is tangentially concerned —for example, a proposed new layout. Such a subject gets into many phases of the daily operations and it is sufficiently comprehensive to give the interviewer ample opportunity to cover all sides of the interviewee's personality, philosophy, competence, and judgment.

Consider these typical cases:

Case #1

Symptom: Foreman doesn't consider himself part of management. He refrained from helping to introduce a new incentive plan and his comments to the workers bordered on disloyalty to the company.

Remedy: After he was shown why the company had to become more competitive, and warned that a negative attitude would no longer be condoned, he put his shoulder to the wheel. The incentive was an outstanding success.

Case #2

Symptom: A superintendent stated that he would compensate for an uneven flow of production by daily layoffs.

Remedy: The desirability of providing steady work was first explained to him. Then, operations were combined to create an even work-flow and the labor force was reduced to the minimum. Demand beyond the capabilities of the minimum crew were filled by working overtime, which was less expensive than maintaining the former larger crew. In working out the improvements, he took an active and constructive part.

Case #3

Symptom: The engineering department's problems continued unsolved after a new vice president was brought in. Resentment by immediate subordinates caused a crisis. The appraisal indicated that the new man while extremely personable, was incapable of providing the required leadership.

Remedy: Harmony was restored when the executive was released and a capable subordinate was elevated to his position.

Case #4

Symptom: Production methods were poor and utilization of manpower was extremely wasteful.

Remedy: The superintendent, a staff man by nature, was transferred to production planning, where his talents were actually needed. A line man was hired to take his place.

Case #5

Symptom: The superintendent of a very large press shop was about to be released because utilization of presses was poor, rework was high, and idle time was appalling.

Remedy: Machine loading charts were introduced, along with controls to allocate responsibility for defects and waiting time. The superintendent was exonerated after he was supplied with the management tools needed.

Case #6

Symptom: Quality Control was ineffectual and costly in terms of labor and scrap.

Remedy: A new Quality Control manager, thoroughly versed in the subject, was hired. Final inspection was replaced by process inspection, and the charts used to record deviations and trends were analyzed to determine and correct the causes of rejects before the quality limits were exceeded.

Case #7

Symptom: All superintendents side-stepped their responsibilities and acted only on direct orders from the general manager. Scrap was high, grievances were numerous, and inventory losses were very costly.

Remedy: The general manager was replaced by an executive who knew how to delegate responsibility and get results without having every detail brought to his attention.

Case #8

Symptom: A factory manager attempted to maintain his position by isolating his operations from top management and defending every action he had taken. The division continued to show a loss.

Remedy: A cost control procedure was installed. This proved beyond doubt that administration was poor and pointed out specific areas where improvement could be made. When the superintendent argued that economies could not be effected he was ordered to make reductions. After management's position was vindicated, he continued to be antagonistic. Demotion caused great resentment and, finally, he was terminated.

These cases bring out the reasons profits were forfeited and indicate that the remedies were easily applied after the facts were learned through appraisal.

Although the causes of the symptoms were attributable, in the final analysis, to management, this is not an indictment. No management group can or does do everything right every day. The problems cited were caused by:

- Allowing a negative attitude to continue until a crisis was reached.
- Putting a poorly qualified man in the important position of superintendent.
- Selecting a vice president whose attractive personal qualities far outweighed his knowledge of the position without properly evaluating the merits of candidates already in the company's employ.
- Expecting a natural staff man to perform satisfactorily in a line position.
- Accepting large operating losses on the assumption that they were beyond the control of the individual in charge.
- Using an untrained supervisor in a highly technical area.
- Operating as a one-man show and not delegating responsibility.
- Permitting empire building at a cost of excessive clerical help and damaged customer relations.

After the appraisals had disclosed the reasons, management quickly took corrective actions. No attempt has been made to evaluate the gains but it is obvious that, as a profit determinant, executive appraisal payed off handsomely.

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Fig. 1. Protective sheet of paper is stripped from wire cloth, exposing surface coated with pressure-sensitive adhesive. Fining tools to produce prescribed lens curvature are lined up for immediately up-coming prescriptions. Minimum complement for basic laboratory is 500 such tools.

A Clue to Lapping Irregular Surfaces ?

Fig. 2. Wire cloth disc is laid over tool surface and pressed down with fingers. Slight movement between lengthwise and crosswise wires permits wire cloth to smoothly conform to tool curvature without humps or creases.

HERE IS A DEVELOPMENT in the optical industry that gives promise of many applications in metalworking. Whenever an irregular, odd-shaped metal surface needs to be lapped for finish or fit, a "flexible" lap may well be the answer—form fitted to the job.

This disclosure of a new technique has sparked our imagination and we pass it along for your consideration in applications unanticipated by the originators.

Tool wear during "fining" (a finishing operation just before final polishing) is entirely eliminated through use of wire cloth as an abrasive carrier by American Optical Co. in its Integrated Surfacing System for grinding opthalmic and corrective-protective prescription eye glass lenses. The Integrated Surfacing System, developed by American Optical and being introduced in its 250 laboratories across the country, incorporates a throwaway wire cloth disc made of 0.007″ electrogalvanized steel wire woven to 30 x 30 mesh by Reynolds Wire Div., of National-Standard Co. Applied between tool faces and the lenses being fined, the wire cloth also improved tolerances, reduces fining time, and cuts costs.

The wire cloth holds an emulsified emory suspension between the lens being finished and the "fining" tool. All abrasive action takes place at the interface of the wire cloth and the glass lens, with no wearing action on the tool.

The wire cloth is cut in 2-⅝″ dia circles and is backed with pressure-sensitive adhesive and a protective paper. The protective paper is stripped from the adhesive and the wire cloth disc applied flat on the tool face. The uniform spaces in the weave hold the emulsified emory suspension in contact with the lens in the curvature of the tool for the fining operation—the operation between generating the basic curvature of the lens and the final polish. The fining tools are compensated 0.06 mm for the thickness of the wire cloth.

To insure accuracy, wire diameter is held within a tolerance of ± 0.00015″ and weaving tolerance is held within ± 2%. Uniformity of precision in the new Integrated Surfacing System has virtually eliminated "do-overs" (lenses that had to be reworked).—**E. W. P.**

Collins Programs a Numeric

By Allan Young

Ideas . . . requirements . . . decisions

AFTER INVESTIGATING and evaluating numerically controlled machines, we realized that there was a definite need for this type of equipment in several areas, especially for the problem of producing holes in parts. A decision had to be made as to which type machine would be most readily available, most adaptable to our type of work, simplest to operate—and from which we could learn more about numerics in general.

We realized that if the initial procurement was faulty—if the machine proved to be too complex, too difficult to program, too full of "bugs," or affected our attitude toward numerics adversely in any way—it would be most difficult to continue further with this type of equipment.

What we needed was a machine to cut down leadtime by eliminating tooling; one which could be programmed quickly and easily for short run production and still hold fairly close tolerances, and which used a type tape on which we could plan to standardize. Based on all this information, a recommendation was made to purchase a 6-turret Burgmaster 2BHT with General Electric control system.

The machine automatically controls changes in spindle feeds and speeds and coolant. Command stops are typed right into the control tape, which is prepared from a program sheet on a Flexowriter by any good typist.

WHEN THE DECISION to procure the Burgmaster machine was made we set up a standard programming procedure.

First, since the machine's zero point is fixed (it is adjustable within 0.020″ both ways) and all dimensioning in programming is given from this point, we decided to establish the zero point permanently and physically on the table. One suggestion was to bore a hole in the table at this point. But, since we needed a universal type of fixture plate or sub-plate anyway, we decided to mount it to the table permanently and establish the zero point on it.

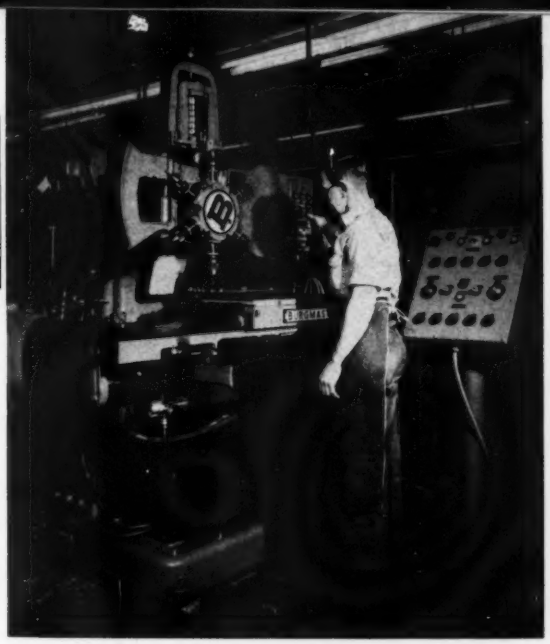
To simplify fixturing, the subplate is equipped with hardened and ground guide rails on one side and the back, with the ground surfaces located a specific distance from the zero point. Tapped holes are provided to allow for fixture clamping.

Fixturing

The universal fixture which accommodates most of our flat parts (Fig. 1) consists of a Bakelite base plate with a row of locating pins along two sides and a grid-work of

Mr. Young, a Tool Engineer at Collins Radio Co., Cedar Rapids, Iowa, was assigned the task of evaluating numerical control for the company. The evaluation turned out in favor of numerics, and his story on the use of their first acquisition is an interesting one.

Turret Drill



Collins Radio's first (and successful) fling with tape control—a 2BHT Burgmaster.

tapped holes for clamping screws. Toe-clamps hold the part in place. Holding the part back against the locating pins is not a problem, but holding it flat against the base can be very difficult. (Breaking a few drills, as a result of the part riding upward on the drill during retraction, can teach the importance of clamping soon enough.)

Several locating pins are placed in a row along two sides of the universal fixture. This allows for locating and holding various size parts in the same fixture. The fixture is designed to align the locating surfaces of the pins with the zero reference point on the table, thus allowing all dimensioning in programming to start from the top edge and left side of the part; in effect, a jig bore layout.

Figure 2 illustrates a simple type of special fixture for drilling two parts in sequence. One station is unloaded and loaded while the other is under the drill. Note that the stations must be far enough apart to allow the turret to revolve without danger to the operator's hands.

Both the universal and the special fixtures are positioned against the hardened and ground guide rails on the sub-plate and bolted or clamped into place.

Fig. 1. Universal fixture, with locating sides of the positioning pins set at the table's zero position. Thus, all dimensions typed into the tape are exact print dimensions from the edge of the part's edge to the hole to be drilled.

Programming a Part

A 5/8″ thick aluminum part (Fig. 3) is typical of the work done on the Burgmaster with the universal fixture. The release quantity for the part was 42, not enough to economically justify a drill jig. The operations proposed by Industrial Engineering are as follows:

- Saw to size.
- Drill ten 0.136″ dia holes and two 0.281″ dia holes, C'bore six 0.136″ holes.
- Lay out, drill, and tap one 4-40 hole in edge.
- C'bore two 0.281″ dia holes.
- Mill two corners.

The tapped hole, and the 1″ dia C'bores are not produced by the Burgmaster. All other holes and C'bores are ideal for this machine. It must be remembered that some work can and should be done outside, rather than tie up a valuable machine for unnecessary operations.

Since all dimensions for the drilling operation originate from two sides of the part it was logical to locate two sides against the pins. The upper left-hand corner of the

Fig. 2. Simple fixture plate for drilling two indentical parts in sequence—one is loaded while the other is drilled.

part (the intersection of the two locating sides) will be at the zero reference point when the part is placed on the fixture. Consequently, all programmed dimensions when typed on the tape will be the exact dimensions from the edges of the part to the holes.

Starting with the hole closest to this corner, all holes are numbered in the order in which they will be drilled. The hole sequence should allow for as small a table movement as possible between operations.

For smaller parts, such as this, all holes of one size may or may not be drilled in succession. Time for table movement or turret rotation seems to differ only slightly. However, where the next hole to be drilled involves quite a table movement, it is wise to finish each hole completely in sequence.

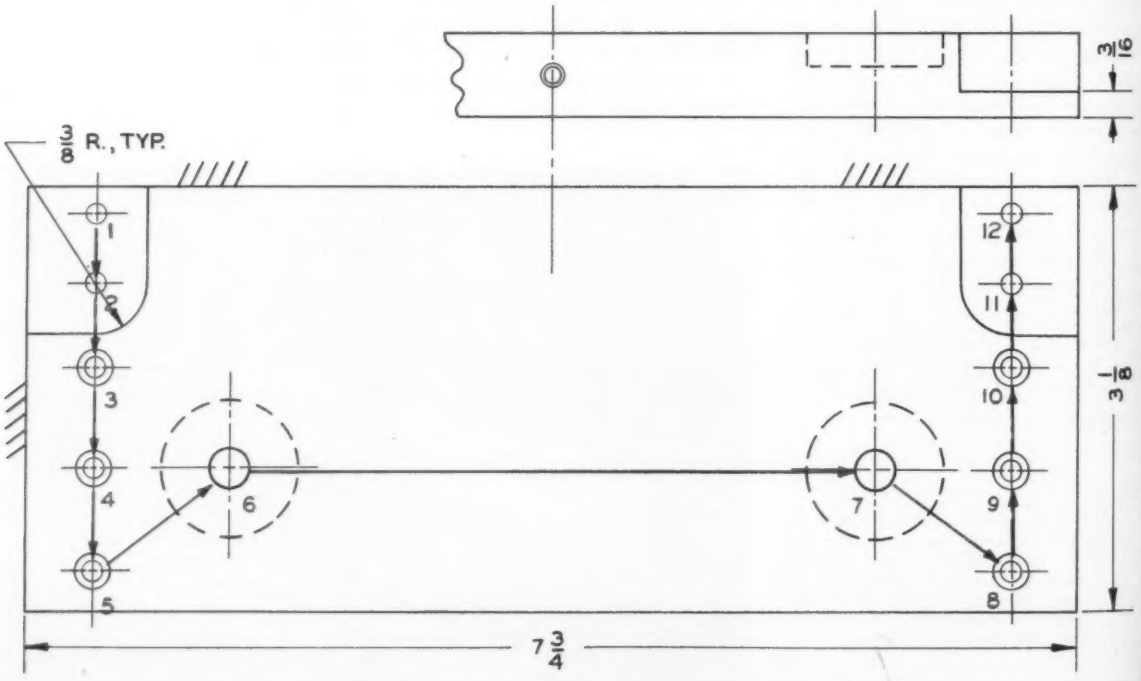
The program sheet (Fig. 4) provides for a center drilling operation to prevent the unguided drill from leading off when it is started. (As soon as we receive the spiral drill grinder we have on order, the need for center drilling should be eliminated.) Note that center drilling follows holes #1 through #12 and then the drilling operation comes backward, #12 through #1. This keeps table travel at a minimum and eliminates the need for the table to move all the way back to the #1 hole and start over again.

The "C" designation on the program sheet indicates the turret station applicable to the particular position. Once a turret station is typed into the tape, it remains in position until a different one is typed in.

This also holds true for dimensions. When several holes appear on the same centerline it is not necessary to repeat the position in the tape. This is evident in the typewritten text produced by the Flexowriter during preparation of the tape.

Note that no decimals, commas, or spacing are used—they mean

Fig. 3. Sequence of holes to be drilled and C'bored in a 5/8" thick aluminum part, allowing minimum table travel between operations.



Part	Tape Controlled: Programming Time Including Checking, Typing	Tape Controlled: Fixture Cost Design, Build (estimated)	Tape Controlled: Total	Conventional Tooling: Fixture Cost Design, Build (estimated)	Conventional Tooling: Fixture Time* Design, Build
1	0.9 hr	None	$ 3.15	$120.00	1 wk
2	4.1	None	14.35	430.00	3
3	16.4	None	57.40	690.00	3½
4	1.2	$45.00	49.20	230.00	2
5	1.7	$25.00	30.95	85.00	1½
6	1.3	None	4.55	170.00	2
7	1.1	$40.00	43.85	220.00	2½
8	2.4	None	8.40	150.00	3

* Based on ideal conditions in the toolroom.

Table I. Cost Comparison—Tape Controlled and Conventional Methods.

nothing to the tape reader and merely add complexity to the typing operation. All dimensions for the operation described are in three-place decimals, but since the reader reads in five places all five must appear on the tape. Hence, A00500 indicates an "A" dimension of 0.500".

The auxiliary function "M" is the Stop Coding. It appears after the first operation, so after drilling a part, the table returns to the first hole position before it stops. After the operator unloads and loads the fixture, he must push the Start button on the control panel to set the machine in motion again.

Results in Use of the Burgmaster

The machine, so far, has proven that it can hold a 0.005″ tolerance between holes and on counterbore depth, measured from the bottom of the part up to the bottom of the counterbore. (Hole depth, spindle speed, and feed for each turret must be pre-set manually on this machine.) It has cut down lead-time, as we had hoped, by eliminating drill jigs, and consequently reduced the tool budget on certain jobs. Table 1 is a comparison from a tooling standpoint only, not considering running time, and illustrates how the numerical Burgmaster is working out as our first investment in the field of numerically controlled machines.

It might be noted that the last column on time to design and build jigs is based on ideal conditions in our own toolroom, and should be considered a conservative estimate.

Future Prospects for Numerics

Based on what we have learned about numerically controlled operations from this first machine, two more drills have been procured, and a tape controlled jig borer is on order. We have no immediate justifiable need for continuous path machines so concentration is on hole spacing and similar production.

Something along this line is being evaluated for the production of printed circuitry, from a standpoint of holding close tolerances. As so often is said, "Numerical Control is not coming, it is here." Once you get your feet wet, a need for this type of equipment can be seen in many phases of manufacturing, and initial procurement of the machine most suited to your needs is the most important move to be made.

Extra copies of this article are available while supply lasts. Write Tooling & Production Magazine, 1975 Lee Rd., Cleveland 18.

Fig. 4. Program sheet, prepared by Tool Design for the part shown in Figure 3. Inset shows portion of typewritten sheet made up from the program sheet. Tape is punched as typewritten copy is made.

How to Double Your Life

. . . and still have the advantages of positive rake.

A DEVELOPMENT has been brought to our attention that should save a high percentage of the present cost of inserts. It is accomplished by simply grinding positive rake chipbreaker grooves in negative rake inserts (in all cases we will be talking carbide throwaways).

The negative rake was used 20 or more years ago to allay the rupture of the carbide of that day—it was not tough. But even now, with excellent carbides and the throwaway well entrenched, negative rake geometry is still necessary; for very high tensile steels, for example. With the negative rake still in existence when throwaways came in, it became obvious that the negative rake theory allowed the use of all cutting edges on both sides, allowing long life. For instance if an insert is a triangle shape it will have six cutting edges—thus a 50% increase in its life.

This increase is impressive but it doesn't represent the same increase in insert savings unless, the use of a negative rake is the only solution to a particular metal removal problem. On the other hand, where a positive rake is usable its use will offer longer life for any one cutting edge than will a negative rake on the same cut. This is due to the lower cutting force requirement, and reduced wear because of this. A positive rake edge will produce about 25% more work before indexing. This is an advantage, except when using a positive rake holder. With this setup the insert can't be turned over after indexing through all edges on one side. They would either have to be reground or thrown away. There are those who feel regrinding is not practical.

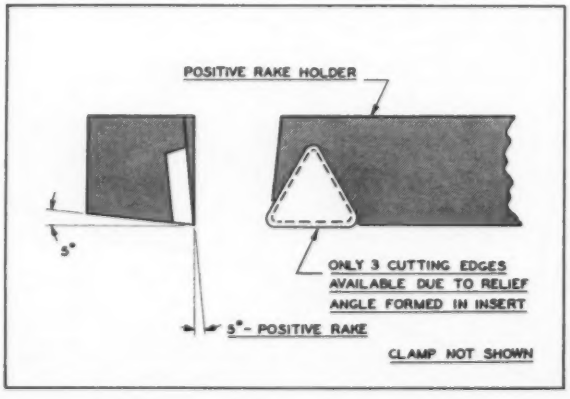
So, in cases where negative geometry is not a must, it is always best to use the positive attack. This is where the new grind comes in. Even though you have a number of negative holders and negative inserts in stock, you can have the advantages of positive rake angles by having positive chip breakers ground-in.

This permits the use of all cutting edges—through both indexing and turnover—as well as the use of your present inventory. It might be worth consideration to buy all negative holders and inserts, thus having the option of using either positive or negative tooling with a minimum of inventory.

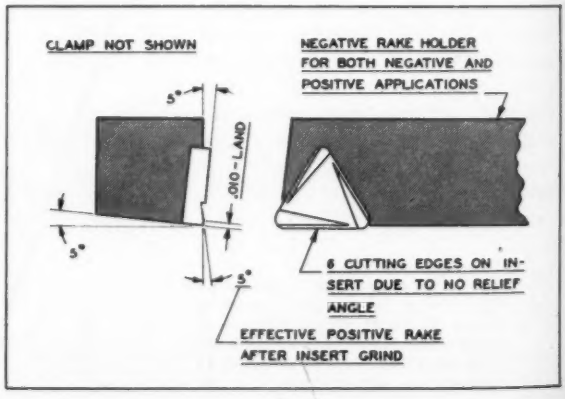
Even before Allied Tool Products came up with their grind service and source of supply for new negative inserts containing positive chipbreakers, authorities were saying: Negative-rake angles should be specified for over-all economy. This was strictly because of the increase in available cutting edges. So now this advantage, coupled with the advantages of the positive rake, offers great savings and versatility. —W. E. H.

Besides all the other advantages of negative rake cutting tools, with positive ground-in chipbreakers honing a negative land is no longer necessary. With this special grind a 0.010" land is automatically provided. It should be noted that the chipbreaker grind is done at a 10° angle. This explains the 5° effective positive rake when mounted in a negative holder.

Before This Development


POSITIVE RAKE HOLDER
5°
ONLY 3 CUTTING EDGES AVAILABLE DUE TO RELIEF ANGLE FORMED IN INSERT
5°- POSITIVE RAKE
CLAMP NOT SHOWN

After


CLAMP NOT SHOWN
NEGATIVE RAKE HOLDER FOR BOTH NEGATIVE AND POSITIVE APPLICATIONS
5°
.010-LAND
5°
5°
6 CUTTING EDGES ON INSERT DUE TO NO RELIEF ANGLE
EFFECTIVE POSITIVE RAKE AFTER INSERT GRIND

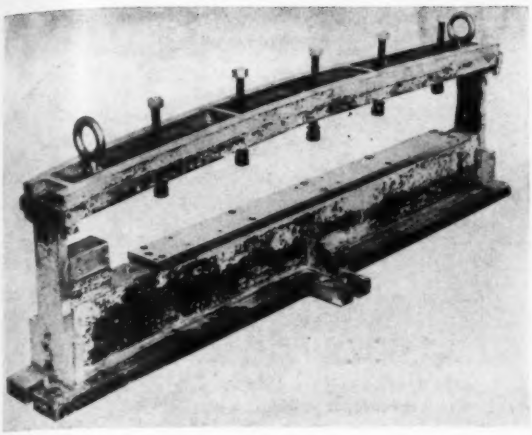


Fig. 1. Bolt-type fixture was used in manual clamping method for milling of fuel plates.

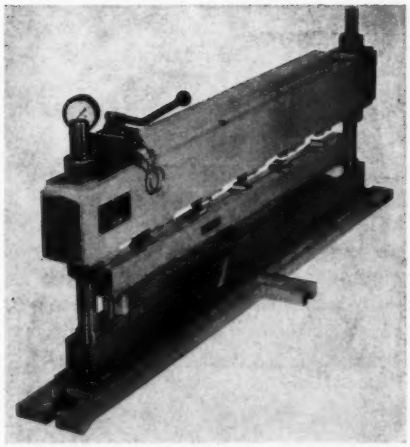


Fig. 2. Hydraulic clamping replaced previous method of holding fuel plates for milling.

Handy Hydraulic Clamp Combinations Save Time

OFF-THE-SHELF hydraulic tooling components may not be a cure-all for all tooling problems but they certainly are solving clamping problems for a number of companies. Several recent applications of hydraulic clamps have resulted in substantial time savings and increased accuracy.

The Newton Hydraulic Tooling Co. recently installed hydraulic clamps in a bridge fixture used for clamping nuclear fuel plates on a duplex milling machine at M & C Nuclear, Inc.

Highly specialized, and extremely precise duplex milling of 36″ x 3″ fuel plates requires application of pressure approximately every 4″ along the entire length of the material held. Infinite pressure control is necessary to avoid distortion when positioning and holding fragile assemblies for final machining.

The previous method, using manual clamps with bolt-type fixtures (Fig. 1), was replaced by the hydraulic clamping shown in Figure 2. All of the clamps operate simultaneously from a single hand pump conveniently mounted on the fixture, resulting in faster operation and greater accuracy.

Further advantages over the former method include versatility and ease of operation. The clamps may be used in any position, are self adjusting and exert constant pressure at all points of contact. Operator fatigue is minimized since only one precisely calibrated adjustment is made per clamping, as opposed to many individual hand adjustments in the former method.

Another company that has used hydraulic clamping to save time and money is the Triangle Package Machinery Co. A fixture was designed for machining fragile guide rails for the conveyor system of a meat packaging machine. The guide rails must be held rigidly and without distortion while two right angle surfaces are milled on each rail. The fixture shown in Figure 3 consists of 10 hydraulic cylinders with a 7/8″ bore and 1/2″ stroke, each having a thrust of 1200 lbs. Line pressure is 2000

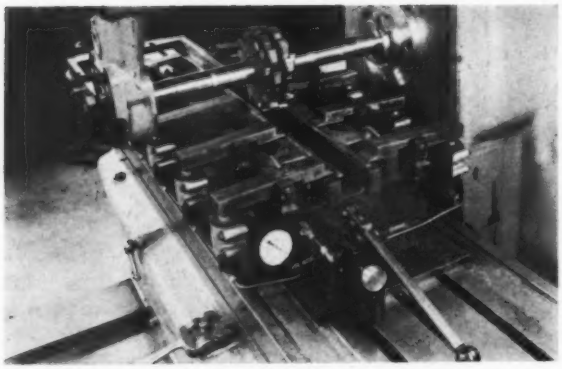


Fig. 3. Ten-cylinder hydraulic clamping fixture saved time in milling fragile guide rails.

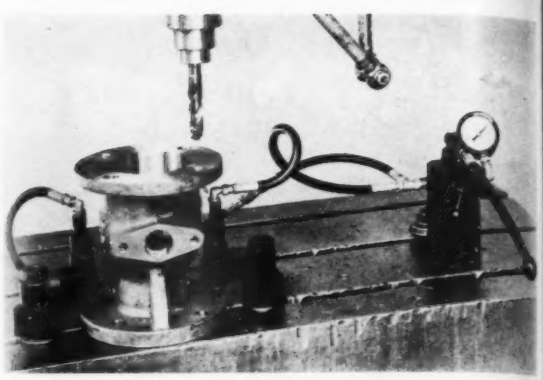


Fig. 4. Components holding part for drilling can also be used for milling, when needed.

psi and a 10 cu. in. capacity lever pump is used.

Using mechanical clamping methods, floor-to-floor time averaged 57 min/pc, including setup time. With the hydraulic tooling system, average floor-to-floor time is 17 min/pc including setup time. This represents a saving of 40 min/pc or a production gain of 335%.

A general purpose clamping setup is used in many parts at Lodding Engineering Corp. On one particular job they had been producing 80 pcs/day. Production is now 96 pcs/day, showing an increase of 20%.

The previous method was to clamp with regular straps and hold-down bolts. Rest blocks had to be changed when parts were changed. Now, using a hydraulic cylinder with 1/2″ travel, the setup does not have to be changed.

The setup shown in Figure 4 is used for many different parts. Similar setups of the same components are used on a milling machine. The company has also benefited by saving time in searching for various straps and hold-down bolts.

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Simple, Accurate, Rugged– New Double-Spindle Disc Grinder

AUTOMATIC OR MANUAL spindle feed control, simplicity, durability, and accuracy—these are the key words that describe the new double verticle spindle disc grinder, being introduced by Besly-Welles Corp.

The Model DV2 offers optional push-button spindle feed units that permit feed increments from 0.0001″ minimum to 0.0012″ maximum per impulse. These units, coupled with gaging equipment, provide automatic sizing and allow the DV2 to be virtually automatic.

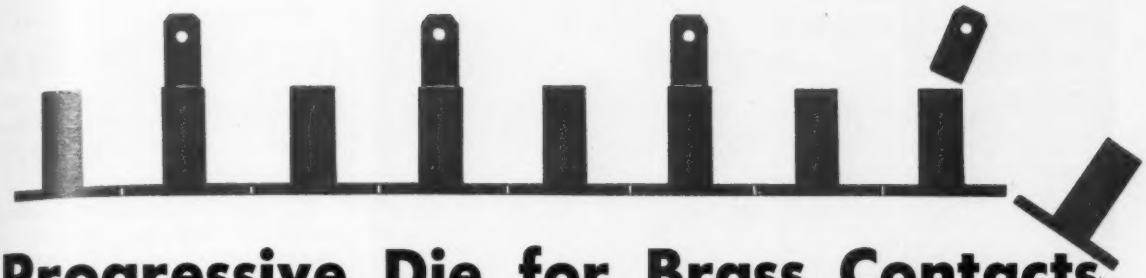
In addition, large, conveniently-located handwheels give the operator manual control of spindle feed, with an accuracy of 0.0001″ per graduation.

Power driven rapid traverse of the spindle and quill assemblies is standard equipment. This reduces time and labor in abrasive and job change-overs. Oil mist lubrication insures cool running operation of the precision duplex bearings in the sealed spindle head construction.

Positive, accurate adjustments are made possible by eliminating backlash on feed mechanisms.

One application of the DV2 demonstrates its accuracy: One was equipped with 14″ dia diamond abrasive wheels to grind the top and bottom of throwaway carbide inserts. At 3,000 passes/hr, three passes were required to remove 0.016″ total stock of 3/8″ IC inserts. Tolerances on the final pass were held within 0.0003″ for flatness, parallelism, and size, with a 4 micro-inch finish.

The new grinder will handle parts ranging in thickness from 0.050″ to 2½″ and 0.375″ to 3″ dia. Besides carbides or hard ceramics requiring diamond abrasives, stampings, plastic parts, Alnico magnets, bearing races, coil springs, carbon parts, etc., can be readily ground with resinoid bond abrasive discs.



Progressive Die for Brass Contacts

Die-Matic Corp. was started two years ago in Cleveland, when Louis J. Zeitler bought a defunct tool and die shop at an auction. Its specialty is progressive dies, like this one for stamping brass telephone socket contacts.

THE TELEPHONE LAMP socket contact, made of 0.016″ thick extra hard temper brass strip, consists of two tabs 1/4″ wide and1/2″ apart. One tab has an extension that makes the contact 1⅛″ long. The tab without the extension is 5/8″ long. They are connected by a base 1/16″ wide.

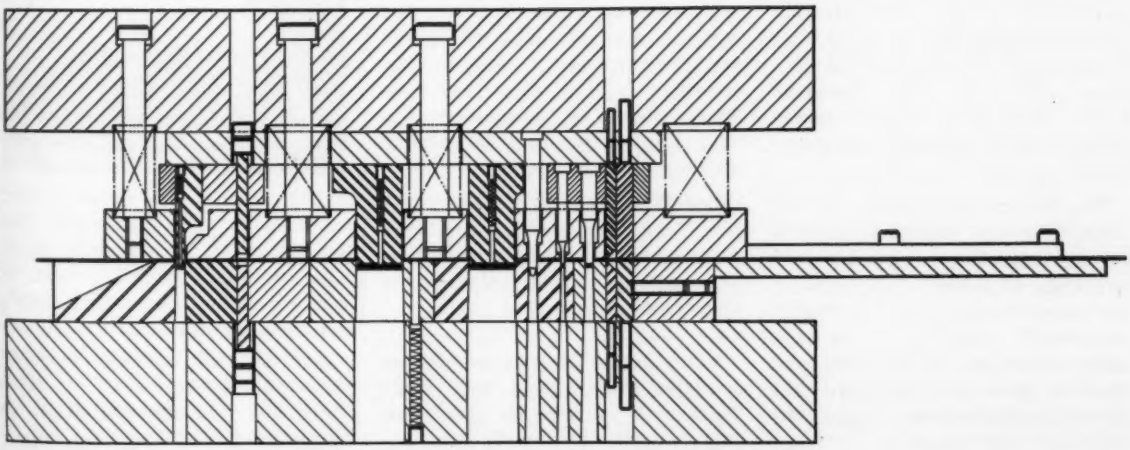
The contacts are used in various groupings. To facilitate manufacture, handling, and use, the basic contact units are fabricated in strips of six. There are serrations 0.003″ deep on both sides of the metal so the contacts can be separated into any desired grouping and length. For example, when a contact with one long extension followed by two short tabs is needed the user simply breaks off a group of three tabs so that a short one is in the center. He then breaks off one of the tab extensions. This gives the desired grouping.

The depth of the serrations is important. If they were made too deep, the contacts would break and separate in the die or during handling. If too shallow, the pressure applied to separate the parts would also cause them to bend.

Both the nature of the design of the contacts and the large quantities required affect the design of the dies and the selection of tool steel for the dies. For example, the serrations are made by serrating knives sharpened to a 45° angle. Because the depth of the serration must be controlled closely the knives require a steel that gives long wear on narrow edges. Darwin & Milner's Neor, a high carbon, high chromium oil hardening tool steel is used for all this, as well as all other blanking, cutting, and coining edges.

Neor has high resistance to wear and abrasion and withstands high pressures well. These qualities

Fig. 1. Drawing of the seven-station progressive die for making telephone lamp socket contact parts.



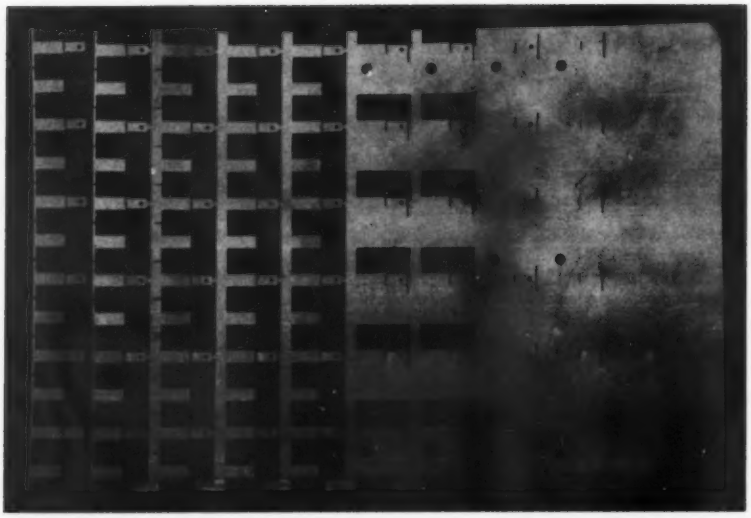


Fig. 2. The seven steps for making telephone lamp socket contacts, "in-strip." Reading right to left, a bevel is stamped by coining punches and serrations are made between the body and extension of the contacts. Pilot holes are pierced. Small holes are pierced in the tab ends of the contacts. One side is blanked, then the other side. Serrations are made. Finally, the contacts are cut off.

along with its nondeforming properties made it Die-Matic's choice since high production is of first importance on this die. Because Neor hardens to a great depth, the production from a die after each grind is consistently uniform. Neor has the following analysis: carbon 2.20%, manganese 0.30%, silicon 0.25%, chromium 12.00%, and vanadium 1.00%.

The holders in the die are made of Darwin & Milner's O-H-T steel, selected because its uniform hardness assures long life. O-H-T also has nondeforming properties in heat treat. Its tungsten and chromium content give better wear resistance than straight manganese oil-hardening steel. The analysis of O-H-T is as follows: carbon 0.90%, manganese 1.10%, silicon 0.35%, chromium 0.50%, and tungsten 0.50%. This steel hardens deeply with a closely refined grain structure.

The die has seven operating stations. The first station includes a coining operation which forms a bevel on each side of the end of the tab extensions. It's done before the contact is blanked out, to minimize elongation. At the same time the serrations are produced between the main body of the contacts and extensions.

Pilot holes are pierced at Sta. 2. Holes 1/16″ dia are pierced in the tab extensions of the contacts at Sta. 3. One side of each of the contacts is blanked at Sta. 4. (The side of the contacts at the edge of the metal strip are notched out.)

At Sta. 5 the other side of the contacts are blanked. The short serrations which allow the contacts to be separated into the desired widths are formed at Sta. 6. There are 11 short serrations, all made to a depth of 0.003″ from both sides.

The parts are completed at Sta. 7, where the base of the contacts are cut from the six tab extensions.

Because the brass used in making the contacts is only 0.016″ and is extra hard temper, die clearance is held to 5% per side. When clearance dimensions are held as tightly as this, perfect alignment is required.

Die-Matic equipped all the punches in the die except the 1/16″ dia punches with needle strippers to assure positive stripping of the slugs from the punches.

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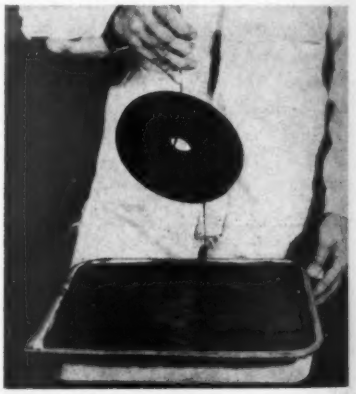
Dunking for Profits

When simple, do-it-yourself dunking of a grinding wheel can pay off in longer wheel life, fewer operations from roughing to finishing, and in final work surface quality, it would seem that it's time to dunk.

The solution to many grinding problems, and the solution in which the wheel is dunked, is KGP's "Dri-Kool," a suspension of collodial in a neutral oil carrier. Once the wheel has been impregnated by dipping in "Dri-Kool," its pore surfaces throughout become coated with a parting medium. After the wheel drains and dries, the remaining film of solid lubricant (graphite) prohibits the chip metal from gripping the abrasive and bond surfaces with the usual affinity. Thus the treatment retards wheel loading and functions as a dry coolant.

Users are reporting burn-free, burr-free dry grinding of high speed steels for the first time. Dressings are less frequent; wheels last longer although grinding is faster. Micro-finishes are improved on such abrasive-resistant materials as M-3 HSS when burn was formerly encountered.

Impregnating a wheel with



KGP's "Dri-Kool" takes 5 min, followed by a drying period. This one treatment lasts for the life of any vitrified bonded wheel. It won't wash out, and the wheel's dynamic balance is unaffected.

For detailed information write King Graphite Products, Inc., 21940 Telegraph Rd., Trenton, Mich., or Circle Inform-A-Gram No. H1.

Accurate Threads Demand Accurate Machine Alignment

The importance of good machine alignment when cutting threads cannot be over-emphasized, and has been stressed for years as more and more effort has been exerted to satisfy the demand for better threads. Many firms which do not regularly check their machines find it expensive negligence.

Admittedly, it is a tedious task to use an ordinary dial indicator for this job. To clamp such an indicator to a round piece of stock in a work spindle requires a small indicator and a small clamp, especially when checking a fully tooled 00 B&S automatic screw machine. The finger of the dial indicator is revolved around a test bar and a mirror is then needed to see the indicator reading when it revolves to the bottom of its travel. The lengthy method of checking for misalignment has been the chief cause of neglecting this very important item.

With the new H&G Alignment Indicator (Fig. 1)the important information of how much misalignment exists can be quickly determined. This indicator is secured in the die head spindle or turret where the die head is used. The spindle or turret is then moved toward the work in the spindle (Fig. 2).

The work enters the bevelled recess of the front disc of the indicator. This indicates the amount of misalignment and the screws are tightened to secure the setting. Your one inch micrometer will give you the misalignment in thousandths (Fig. 3.) as well as the direction of misalignment.

The indicator will take in any size stock between ⅛″ and ½″ which, of course, must be chamfered or turned down and faced on the end to run true.

How much misalignment can be tolerated without affecting the accuracy of the thread? This depends largely on the pitch and other conditions. There are concerns which do not use a die head on a 00 B&S when it is more than 0.002″ misaligned. This is because it is unusual to cut much coarser than 20 pitch, and generally pitches are cut much finer on these machines. The finer the pitch the greater the alignment accuracy required.

Another firm which cuts many 0-80 to 2-64 threads finds it is important that misalignment is kept under 0.001″ with no float in the die head. An 80 pitch thread is only 0.008″ deep and 0.001″ is ⅛th the depth. This means that with 0.001″ misalignment, two chasers in the die head would cut 0.007″ deep while the other two chasers would cut 0.009″ deep. On a percentage basis this seems quite an error and it accentuates the need for good alignment for all pitches.

The allowable misalignment in some shops for threads cut usually on machines larger than the 00 B&S is 0.003″. With this amount of misalignment in a thread of 16 pitch, which is about 0.040″ deep, two chasers would cut 0.037″ and two could cut 0.043.″ This is a difference of 0.006″, quite a percentage of the thread depth. There is usually a very small amount of float in H&G die heads which helps to compensate for slightly inaccurate conditions. Another important factor to bear in mind is that misalignment will affect soft materials much more than hard materials.

Too much confidence is put into the alignment accuracy of new machines. Machines are accurately made but many new machines have been found to be badly misaligned when first set up. This is often caused by uneven floors and sometimes by careless handling in shipping. Misalignment causes rough threads, tapered threads, poor thread form and faster chaser wear.

Write The Eastern Screw Machine Corporation, 140 Truman St., New Haven 6, Conn., for illustrated information on the H & G Alignment Indicator and H & G Die Heads, or Circle Inform-A-Gram No. H2.

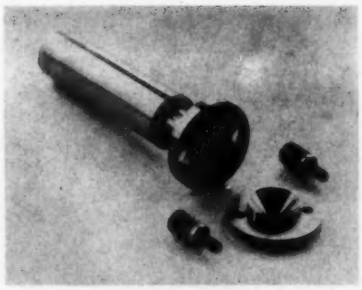


Fig. 1. This view of a dissembled H & G Alignment Indicator, shows how it functions.

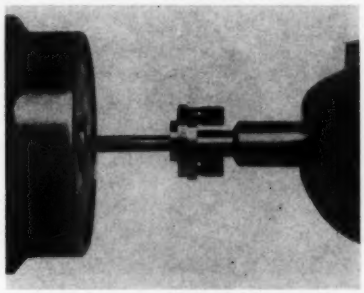


Fig. 2. In working position the indicator is sensitive to any misalignment between machine spindle and turret bore.

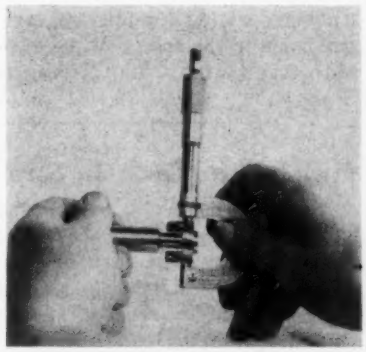


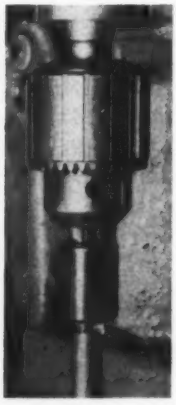
Fig. 3. A quick micrometer check gives both direction and amount of misalignment.

Automation is 'Finger In The Dike' For Aircraft Parts Manufacturer

MIDDLETOWN, Ohio—Numerical control has proved to be the "finger in the dike" for a manufacturer here. When a sudden design change required a shift from aluminum to steel hinges on the Air Force's B-52G, numerical control came to the rescue at Aeronca Manufacturing Corp. The new hinges, which hold lift spoilers on the big bird's wings, were programmed and coming off a numerically-controlled Cincinnati Hydrotel in days instead of the weeks it will take to produce them as 4140 steel forgings. In the meantime, forging dies are being made for the big production runs.

Finish Tube Ends In One Operation

A new cutting tool, called the TuBurr, combines three operations in one for finishing tube ends in screw machines, multiple spindle machines, and tube finishing machines. Made by Cogsdill Tool Products, Inc., the TuBurr tool chamfers both OD and ID and faces, all in one stroke.



Spindle travel toward the tube automatically centers the cone-shaped TuBurr tip in the tube end, eliminating any misalignment. Continued spindle travel retracts the cone into the tool body, exposing the blade for cutting. Upon release of spindle pressure, the cone returns to original position, out over the blade.

Blades are interchangeable and available for any angle or degree of chamfer. Capacities range up to 2½" ID tubing on standard models. Each TuBurr covers a range of tubing sizes by change of blades. Literature is available from Cogsdill Tool Products, Inc., 12980 W. 8-Mile Rd., Oak Park 37, Mich., or Circle Inform-A-Gram No. H3.

Engineering School Enrollment Is Down

URBANA, Ill.—Enrollment in the nation's accredited engineering colleges has dropped for the second straight year, according to the American Society for Engineering Education. This fall 240,063 students registered in engineering; last year there were 249,950; in 1957, 257,777.

Management Climate 'Favorable' To Automatic Control

NEW YORK, N. Y.—A management climate "favorable" to automatic control is viewed by a Minneapolis-Honeywell Regulator Co. official as opening vast opportunities for instrumentation specialists to contribute to the growth of their companies.

"Management is taking a more attentive, if not more aggressive, position with respect to automatic control," George M. Muschamp, engineering vice president of Honeywell's Industrial Products Group, told the New York section of the Instrument Society of America.

"Management has seen ample demonstration, not only in the plant but also in the office and laboratory, of what automatic aids can do. Furthermore, the bogey of labor opposition has been thoroughly discredited, if not eliminated."

This means, he said, that programs once difficult to justify may now be more readily accepted by management.

"The scope of automatic control problems is constantly widening and thus taking the problems and decisions . . . closer and closer to top management," he continued. "Furthermore, the cost of solving these problems and the effect this has upon existing organization is requiring more and more the attention of top management."

If the instrument groups can exercise control in specifying systems, Muschamp said, "they will be doing their employers a great service."

THE TOOL SHOW:

Tooling for Production

— — Detroit, Apr. 21-28

SEVEN ACRES of automation equipment for "Tooling for Production"—worth $15-million—will be displayed at Detroit's Artillery Armory Apr. 21-28, at the American Society of Tool and Manufacturing Engineers' 1960 Engineering Conference and Exhibit.

More than 35,000 manufacturing executives and engineers from the United States, Canada, and many foreign lands are expected. Among the more than 6000 pieces of equipment they'll see there are 1300 machines and devices that were developed during the last year.

Visitors will see everything from minute particles of industrial diamond dust to stamping presses. This representation will enable the Show visitor not only to examine the latest developments in his immediate field, but also to determine how his specialty or special area fits into the vast metalworking picture. Although specialization has become a part of the modern age, coordination of knowledge and ideas from related fields stimulates progress in the specialized job.

In addition to the acres of equipment, visitors will also learn about industrial developments at 35 seminars, panels, symposia, and Techtours, all chaired by leaders of industry, research, and education.

Something new in arrangements this year, the Techtour provides a subject tie-in between technical papers in the morning, afternoon tours, and evening discussion groups. A Techtour on gun drilling is scheduled for Friday, Apr. 22, and includes a trip to the Star Cutter Co. plant.

Another sidelight especially designed for ASTME visitors is a tour of Greenfield Village and The Henry Ford Museum, which traces three centuries of American life during its arts and crafts development. The special exhibit for ASTME highlights the history of American industrial crafts.

At the conferences, ideas will flow from more than 70 technical papers and panel discussions on subjects ranging from automation and milling zircaloy to the engineer's contributions to surgery. These conferences are designed to give tool and manufacturing engineers the newest data on recent devel-

opments and a hint of trends for the future.

A special creative seminar on dimensional metrology will offer 10 papers on the science of measurement. During the two day session, new measuring concepts used in tooling and manufacturing will be analyzed and evaluated by gaging experts.

To complete the Tool Show activities, interests from salt mine operations to lens grinding techniques will be satisfied by the 17 plant tours, scheduled twice a day during Tool Show week. Plants in-

Most of Tooling & Production's Tool Show pages in this issue are devoted to products that will be on display at the Armory. Readers who plan to travel to Detroit for the Tool Show will be able to get a peek at what they'll be seeing by reading the following pages. Stay-at-home readers can receive information on products described by using T & P's handy Inform-A-Gram card.

Technical Sessions

Thursday, April 21

Medicine-Surgery-Engineering

The Engineer in Medicine, by Dr. Carl W. Walter, Harvard Medical School; Peter Bent Brigham Hospital.

Rehabilitation Needs the Engineer, by Willis C. Gorthy, Institute for Crippled and Disabled.

Tooling for the Handicapped—A Challenge to Engineers, by John W. Greve, The Tool Engineer.

Dimensional Metrology Seminar
Thursday-Friday, April 21-22

A two day presentation of the latest developments in applied precision measurement. Topics will range from standard, optical, air, and electronic gaging to numerically controlled inspection techniques.

Friday, April 22

Some Production Considerations

The Turret Drill and Tape Control: An Unbeatable Cost-Cutting Universal Production Tool, by J. L. Burg, Burg Tool Mfg. Co., Inc.

Some Quality Considerations in the Design of Automatic Assembly Machines, by Arthur J. LaRue, International Business Machines Corp., Burlington (Vt.) Plant.

Techtour: "Gun Drilling I"

Gun Drilling in Production, by Joseph Savage, Power Train Group, Corporate Mfg. Staff & Services, Chrysler Corp.

Pressure-Coolant Drills and Reamers for Precision Hole Production, by Herbert Gregg, Star Cutter Co.

Selection and Use of Cutting Fluids for Gun Drilling and Reaming, by Russell F. Balow, Industrial Technical Div., Products Dept., Socony Mobil Oil Co., Inc.

Machine Tool Considerations in Multiple Gun Drilling and Gun Boring Operations, by Eugene R. Delamater, Foote-Burt Co.

Ordnance Tooling

Ordnance Machine-Tooling Policies, by Fred Wittber, and John F. Pauls, Industrial Div., Ordnance Weapons Command.

Pilot Line Tooling of Small Arms Weapons at Springfield Armory, by Thaddeus J. Brusnicki and August R. Brus, Methods Section (Production Eng. Branch), Springfield Armory.

Techtour: "Gun Drilling II"

Panel Participants: Joseph Savage, Chrysler Corp.; Herbert Gregg, Star Cutter Co.; Russell F. Balow, Socony Mobil Oil Co., Inc.; Eugene R. Delamater, Foote-Burt Co.; Glen Johnston, Star Cutter Co.

Public Affairs Forum
Friday, April 22

Engineer's Responsibility to His Community, moderated by Thomas R. Reid, Civic and Governmental Affairs, Ford Motor Co. Panel members: Herschel C. Atkinson, Ohio Chamber of Commerce; The Honorable George D. Clyde, Governor of Utah; Dr. Stanley J. Idzerda, Honors College, Michigan State University; Edwin L. Yates, General Motors Corp.

Saturday, April 23

Standardization and Machine Design

Standardization of Processes, Tooling, and Tool Components as Applied to Eclipse-Pioneer, by David French, Eclipse-Pioneer Div., Bendix Aviation Corp.

On the Efficiency of Machine Tool Suspension, by Dr. Miroslav Sadowy, College of Engineering, Marquette University.

Engineering Enrollments

Some Significant Aspects of Current Engineering Enrollments, by William Thurlow Alexander, Northeastern University.

Trends in Engineering Enrollments, by Leroy K. Wheelock, Engineering Manpower Commission, Engineers Joint Council.

Engineering Curriculum

Engineering Education for the Future, by Dr. William L. Everitt, College of Engineering, University of Illinois.

Tool Engineering—Our Place in Education, by Frederick Preator, Dept. of Tool Engineering, Utah State University.

Improvements Sparked by Research

A Tool Dynamometer for Electrolytic Grinding Research, by Professor Reno R. Cole and Robert A. Needham, Dept. of Engineering, University of California.

Improving Welding Techniques in a Medium-Sized Plant, by J. L. Aldred, Sherman Products, Inc.

Monday, April 25

Value Analysis I

The Tool Engineer's Role in Effective Product Planning, by C. Farnworth, Corporate Planning Staff, Chrysler Corp.

Communications

The Impossibility of Communication, by Patrick M. Beatts, Data Processing Div., International Business Machines Corp.

Metal Cutting I

Machining of Steel Casting Surfaces, by Frank L. Brugger, Kennametal Inc.

Milling Zircaloy—Recommendations from Research, by William Pentland, The Cincinnati Milling Machine Co.

Value Analysis II

Operational Product Analysis and Cost Estimating, by W. L. Shepherd, Corporate Planning Staff, Chrysler Corp.

ASME Exchange Papers

Engineering Application of Digital Computers, by H. D. Irwin, Engineering Service Div., Mechanical Equipment, E. I. du Pont de Nemours & Co., Inc.

New Developments in the Theory of the Metal Cutting Process: The Ploughing Process in Metal Cutting, by Paul Albrecht, Physical Research Dept., The Cincinnati Milling Machine Co.

Radiation and the Tool Engineer

The Proposed Use of Radioisotopes for Die-Life Tests, by Donald Peckner, Materials in Design Engineering.

Sonic Energy as a Production Tool, by Dr. Thomas J. Bulat, Sonic Energy Applications and Research Labs, Bendix Aviation Corp., Pioneer-Central Div.

Metal Cutting II

Production Application of Ceramics to the Machining of High-Strength Steels, by John W. Rodd and Dominic T. Bisceglia, Ordnance Corps, Watervliet Arsenal.

Precision Forming Techniques—Cold Swaging, by Philip A. G. Carbonaro and Samuel Valencia, Rodman Lab., Watertown Arsenal.

Tuesday, April 26

High Energy Forming

Why Form Explosively?, by Dorsie C. Harleman, Basic Industry Branch, Manufacturing Methods Div., Wright-Patterson Air Force Base, and A. F. Watts, Lockheed Aircraft Corp.

A Critical Review of High-Energy Forming Methods, by William W. Wood, Vought Aeronautics Div., Chance Vought Aircraft Inc.

Metal Cutting III

Recent Developments in Ultra High-Speed Machining, by Robert L. Vaughn, Lockheed Aircraft Corp., and Robert T. Krueck, AMC Aeronautical Systems Center, Manufacturing Methods Div., Wright-Patterson Air Force Base.

The Effect of New Developments in Metalworking on The Producibility of High-Temperature Metals, by Richard H. Patchen, Fabrication Engineering, Aerojet-General Corp.

Production Programming

A New Approach to Production Control, by F. C. Janke, Hancock Industries Inc.

Built-In Production Programming Saves Money, by Michael Zajac, Buhr Machine Tool Co.

Automation
Numerical Control Symposium
Tuesday, April 26

Symposium I

Introduction to — Automation — Numerical Control, by James C. Keebler, Automation.

Areas in Which Automation is Useful, by William C. Goeckel, Snyder Corp.

A Hole in the Tape is Worth Two in the Head, by Wallace E. Brainard, Servo Machine Tool Div., Kearney & Trecker Corp.

Symposium II

Field Experiences with Automation, by Robert B. Read, The Cross Co.

Numerical Controls—How We Use Them, by Charles E. Chapman, Flight Propulsion Div'n, General Electric Co.

What is the Future of Automation and Numerical Control?, by Carl F. Stugard, Special Machine Div., Cincinnati Milling & Grinding Machines, Inc.

Wednesday, April 27

Metal Cutting IV

Milling High-Strength Thermal-Resistant Alloys, by Norman Zlatin, Metcut Research Associates Inc., and Robert T. Krueck, AMC Aeronautical Systems Center, Manufacturing Methods Div., Wright-Patterson Air Force Base.

Drilling Very High-Strength and Thermal-Resistant Metals, by Ralph G. Kennedy, Robert Johnson, Nelson Marrotte, and Edwin Brezina, The Cleveland Twist Drill Co.

Heat and The Tool Engineer

Controlled Furnace Atmospheres Improve Performance of Cutting Tools and Dies, by Russell Frank Novy, Lindberg Engineering Co.

Principle and Characteristics of Salt-Bath Furnaces, by Leon B. Rosseau, Ajax Electric Co.

Tracer Control

Numerical Control Vs. Tracer Control of Machine Tools, by Leo M. Cross, True-Trace Corp.

Applications of Numerical Control Proven in Practice, by Richard A. Sitts, General Electric Co.

New Processes

Plasma-Arc Speeds Many Metalworking Processes, by James A. Browning, Thermal Dynamics Corp.

Machining and Welding with Electron Beam, by Karl Heinz Steigerwald, Electron Beam Dept., Carl Zeiss Co. and Electrona, Inc.

Thursday, April 28

Metal Cutting V

Cost Saving Through the Use of Throwaway Tooling—The VBU System, by Joseph W. Heinmiller, Chrysler Corp.

New Developments in Throwaway Boring-Tool Applications, by William Yogus, The Valeron Corp.

Control Valves

In-Plant Application of Air Controls, by Walter D. Ludwig, Mechanical Air Controls, Inc.

Using New Signal Sources for Hydraulic-Control Valves, by John J. Pippenger, Double A Products Co., Sub. of Brown & Sharpe Mfg. Co.

Metal Cutting VI

Milling with Throwaway Inserts, by Anthony S. Rogers, Wesson Co.

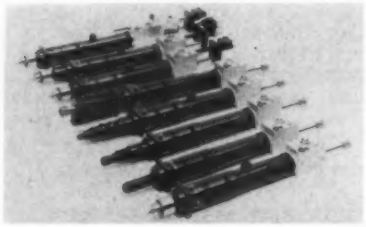
User's Viewpoint on Throwaway-Tip Milling Cutters, by Clifford P. Farr, Massey-Ferguson, Ltd.

Turn the Page and Preview
Products at the Show

Products

At The Show

• Portable Air Tools



Featured at the Buckeye Tool Corp. booth will be the new 21K and 21L automation tools which provide linear as well as rotary motion. Uses include drilling, tapping, fastening, grinding, reaming, and counterboring. Stop at Booth 1809 or Circle No. D1.

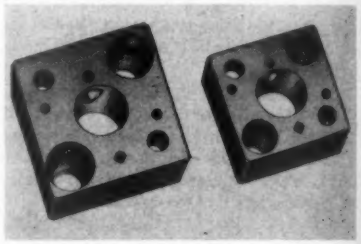
• Electric Jig Grinder

Need a compact, high torque electric unit that will convert any good vertical milling machine into a precision electric jig grinder, suitable for grinding (with carbide) or micromilling holes to tolerances of 0.001″ and closer? Precise Products Corp. will show three basic models at Booth 127, or Circle Inform-A-Gram No. D3.

• Speedy Center Alignment

Enco Mfg. Co. will display its Micro set adjustable center which permits easy center alignment, eliminating guesswork and tailstock jogging in precision or taper turning. Corrective movement is done by an equally eccentric ground sleeve and arbor which complement each other and produce lateral movement of the ground and hardened tips in increments of 0.001″, read directly on the sleeve by the operator. Details at the Booth, or Circle Inform-A-Gram No. D4.

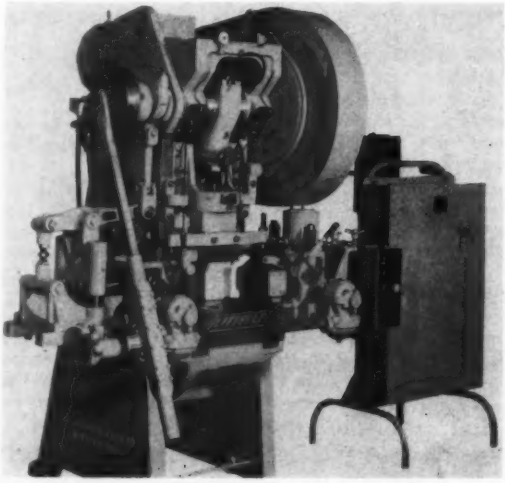
• Bal-Lok Retainers



Designed for quick demounting from dowel pins, the Bal-Lok Kwik-Pull die retainer is made by Porter Precision Products. Two ordinary screws, a twist of a wrench, and the retainer is free of the dowel pin. See them at Booth 932, or Circle No. D5.

• Rack & Pinion Roll Feed

Mounted on an OBI inclinable press, this rack and pinion roll feed is equipped with disc type brakes for accurate feeding at high speeds. It also has a running micro-adjustment which permits adjusting the feed length ±⅛″ while the press is running. It will be displayed by F. J. Littell Machine Co. at Booth 505, or Circle Inform-A-Gram No. D2.



• Toolmakers' Microscope

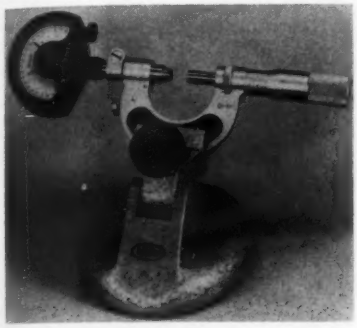
A set of geared drum counters for the Toolmakers' microscope makes it possible to read the coordinate position of the stage directly from counter drums, rather than adding scale, drum, and vernier readings. It will be on display at Booth 845 by Gaertner Scientific Corp., or Circle No. D6.

• Self-Feed Air Tools

Automation at low cost for a wide range of applications will be demonstrated by the Aro self-feed air tools. These tools will perform automated drilling, tapping, and fastening operations. For details, stop at Booth 1918, or Circle Inform-A-Gram No. D7.

• Micrometer-Comparator

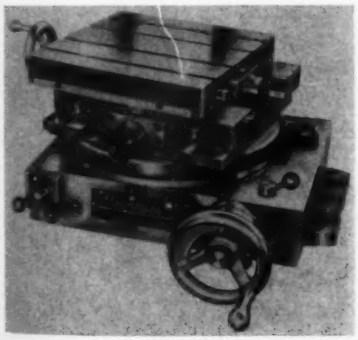
A super-indicating micrometer-comparator, with removable indicator reading directly in 0.000020″, is being introduced by Mahr Gage



Co. The micrometer reads in tenths by means of vernier. Removable comparator gaging head is graduated into 0.000020″, having a range of ±0.001″. See it at Booth 130, or Circle Inform-A-Gram No. D8.

• Cross-Slide Rotary Table

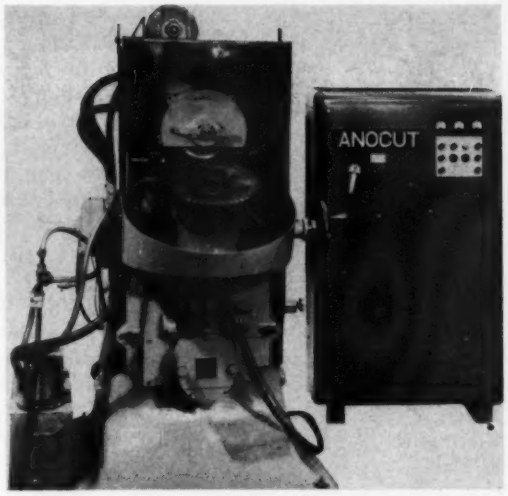
A rugged, high precision tool, the cross-slide rotary table, designed to reduce setup time will be shown by Morrison Machinery



& Engineering Corp. Once located and clamped on the unit, it's rarely necessary to move or re-clamp the workpiece until all cuts are complete. Visit Booth 1543, or Circle Inform-A-Gram No. D9.

• Power Supply Unit

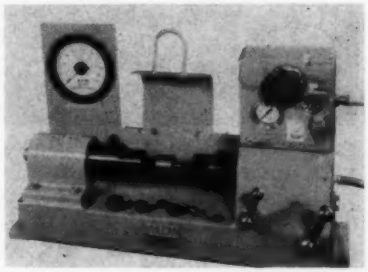
An Oliver automatic electrolytic face mill grinder will be shown with Model 300 Anocut power supply unit. The grinder will be arranged for grinding carbide-tipped milling cutters. See it at Anocut Engineering Co.'s Booth 400, or Circle Inform-A-Gram No. D10.



• Extruded Aluminum Bronze

For use as wear strips and wear plates is the new Meier Wearite extruded aluminum bronze material. It's available in 94 different cross sections from Meier Brass & Aluminum Co. Stop at Booth 2020, or Circle Inform-A-Gram No. D11.

• Spin or Speed Tester



This bench model pneumatic spin or speed testing machine, powered by two air motors, is for testing assemblies that require high or low speed centrifugal of mechanical checking. For details, stop at Vulcan Tool Co.'s Booth 1254, or Circle No. D12.

• Dependable End Mills

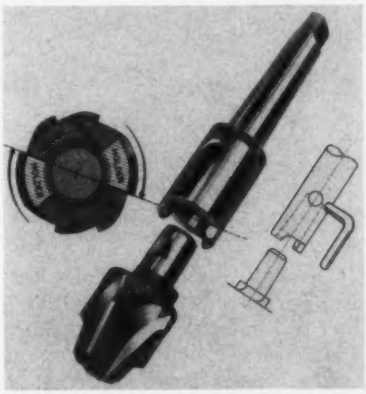
Ski-Kut end mills, one of which recently milled 50 aluminum blocks 6″ x 14″ x 7″ in a day, operating at 314 sfpm, 8 ipm, will be displayed at Booth 439 by Weldon Tool Co. For details, Circle Inform-A-Gram No. D13.

• Simplified Indexing

The new indexing mechanism developed by Enco Mfg. Co. assures precision re-indexing of all Enco turret tool posts to within ±0.0005″. Spring-loaded balls are locked between companion ball seats in the center post and tool block when they're assembled and locked together. This arrangement assures true tool block positioning, as the balls can find only one seat in a spherical recess. Stop at the booth, or Circle No. D14.

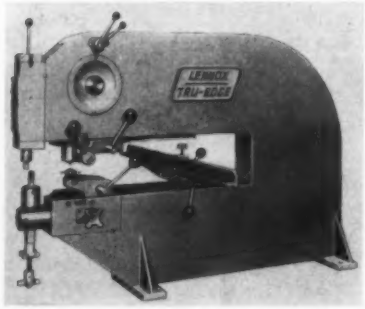
• Tough End-Cutting Tool

Less chatter, better finish, longer tool life are provided by the special Metcut end-cutting tools that will be shown by Metal Cutting Tools, Inc. The Taper Torque drive design provides greater strength and



rigidity and maintains accurate alignment. Stop at Booth 1644, or Circle Inform-A-Gram No. D15.

• Shearing Machines

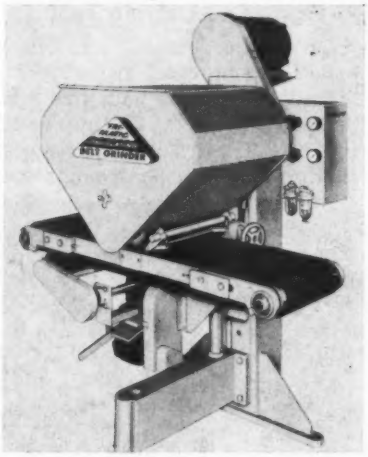


The latest in its Metlmastr shearing and forming machine line, bench Model TE-100, will be featured at Booth 846 by Lennox Tool & Machine Builders. It's portable, cuts in the center of plate without a starting hole, and handles flanging and planishing jobs. See it, or Circle Inform-A-Gram No. D16.

• Heavy Drill Press

Heavy-duty drill presses, which for the first time provide a gear drive to such tools in the medium capacity range, will be exhibited by Boice-Crane Co. Included are 1″ and 1¼″ capacity hand feeders in the 18″ and 24″ classes, respectively, plus a power feed model in the 24″ class to be shown at Booth 744, or Circle No. D17.

• Oscillating Belt Grinder



Demonstration of the aer-tronically controlled belt oscillation and fast abrasive belt changing of the Tri-Matic oscillating belt grinder will be at Booth 531. Applications include deburring, grinding, and polishing. See Sales Service Mfg. Co. for details, or Circle D18.

• Tooling Systems

Two systems of tooling use throwaway inserts for more practical and economic face milling, and in operations which combine boring, chamfering, and facing in the same tool. See the V.B.U. system or V.M.U. system of milling at Valenite Metal's Booth 1209, or Circle No. D19.

• Precision Boring Quills

Precision boring quills, some suitable for OD turning, and others for ID boring with depth control adjustments, on multi-purpose verticle or horizontal bed machines, will be shown by Briney Mfg. Co. at Booth 1365. Tool adjustment as close as 0.0001″ is possible. For details, Circle No. D20.

• Air Gage Comparator

A linear gaging range of 15″ is a feature of the Precisionaire column-type air gage comparator to be shown by The Sheffield Corp. Super amplifications up to 100,000:1 without tube change are provided by the Pneumatic Amplifier and interchangeable scales. The new longer gaging range permits broader tolerances to be checked at higher amplifications and more size classifications. Visit Booth 500, or Circle Inform-A-Gram No. D21.

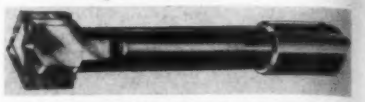
• Modified Core Drills

Pin Mount core drills now have M030 steel cutters as standard high speed steel holders, and a recessed hole in the screw. These features make it possible to complete a single pass operation with no chip problem. See them at Metal Cutting Tools Inc.'s Booth 1644, or Circle Inform-A-Gram No. D22.

• New Vertical Millers

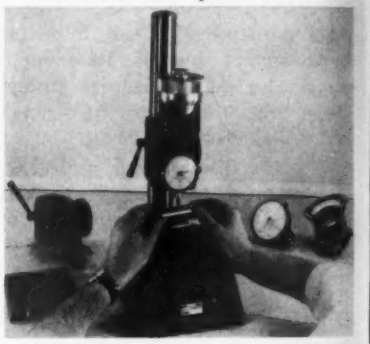
The Millrite vertical milling machine now comes in two new models. It's a full-size, dovetail ram and turret machine, with a 7″ x 27″ table. It has 4″ quill feed, ram movement of 12½″, and is powered by a ¾-hp motor through V-belt drive. See it at U. S. Burke Machine Tool Div'n's booth, or Circle Inform-A-Gram No. D23.

• New Spade Drill



Uninterrupted production — because there's no need to clear hole of chips — is an advantage gained with the new spade drill from Madison Industries, Inc. Coolant flows through tool holder to flush chips. Replaceable cutters reduce tool costs. See it at Booth 1826, or Circle Inform-A-Gram No. D24.

• Versatile Comparator



Air, electric, or electronic dial indicator gaging is easily handled by Model 100B-40 all-purpose comparator from Federal Products Corp. Two arms for use with dial indicators—one with built-in fine adjustment mechanism, or one with a precision micrometer head—can be furnished. It's to be shown at Booth 1000, or Circle No. D25.

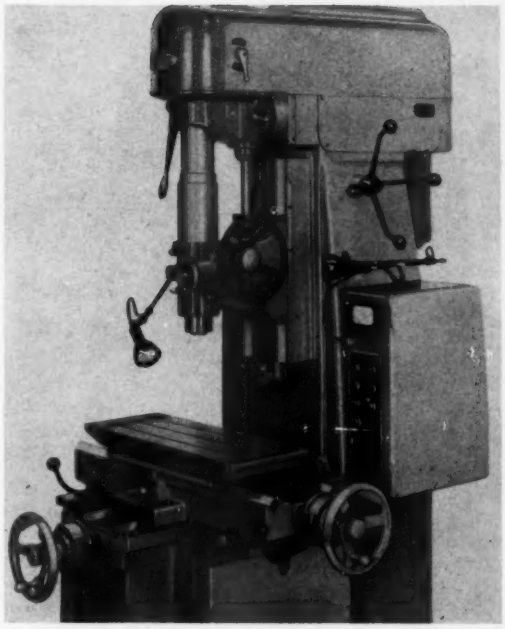
• Air Compressors

Model OEH-38-60 air compressor, the oil monitor control which is furnished on the compressor as standard equipment, and the Commandair twin cylinder pump will be displayed by Champion Pneumatic Machinery Co. See them at Booth 238, or Circle No. D26.

• Mikrokators

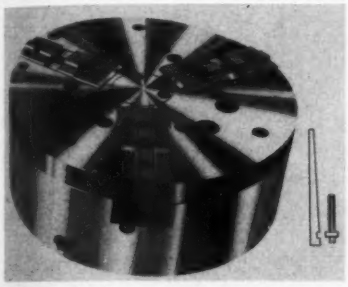
"Feather-touch" measuring pressure is the latest development in Mikrokators, which will be displayed by C. E. Johannson Gage Co. Desired pressure is set using a weighing scale adjustable from 0 to [illegible] grams. Pressure variation for the full deflection of the pointer may be set as low as 0.3 grams. Standard scale graduations range from 0.0001" to 0.000001". Visit Booth 330, or Circle Inform-A-Gram No. F1.

• Versatile Jig Borer



Location, boring, drilling, and reaming of holes in dies, jigs, and production parts with an accuracy beyond 0.0001" are possible with Model 3 jig borer. It features a 60 to 2250 rpm speed range, 11" x 24" table surface, and 20-13/16" height allowance. It will be shown at Moore Special Tool Co.'s Booth 1105, or Circle No. F2.

• Aluminum Power Chuck



Highlighting Buck Tool Co's display will be the new 18" aluminum body power chuck with keyway gibs to take up wear, and new 18" serrated jaw turning fixture. The jig turning fixture and the Ajust-Tru feature permit turning top jaws in the toolroom. Stop at Booth 821, or Circle No. F3.

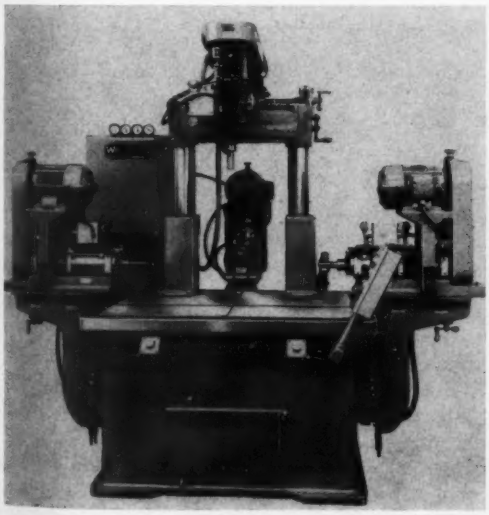
• Tube End Finisher

A tube-end finishing tool to be introduced by Cogsdill Tool Products, Inc., performs three operations in one cycle: chamfer OD and ID, and endface. Cutting blade is in a spring-loaded carbide cone tip. Upon contacting the work, cone retracts, exposing blade. Standard models handle up to 2½" ID tubing. See them at Booth 306 or Circle Inform-A-Gram No. F5.

• Hand Tapping Machine

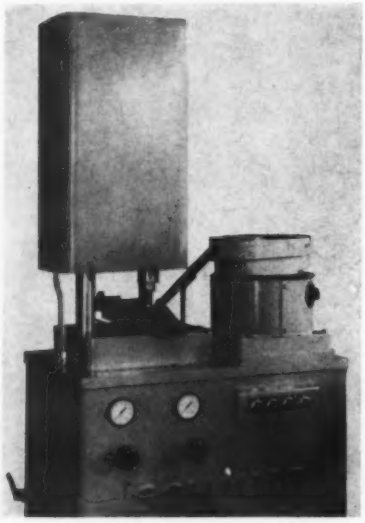
An articulated spindle arm which allows access to all areas of the square work table as well as off the table areas at the back of the machine is featured on the Versa-Tap hand tapping machine. See it at The Producto Machine Co's Booth 1144, or Circle Inform-A-Gram No. F6.

• New Universal Machine



Drill, tap, ream, bore, or combine these operations, using the new universal Wismatic. Packaged tooling, available with the machine from Wisconsin Drill Head Co., means the Wismatic can rapidly be changed from processing one part to an entirely different part in a short time. Any combination can be used with additional units readily added. Visit Booth 621, or Circle Inform-A-Gram No. F4.

• Automated Marking



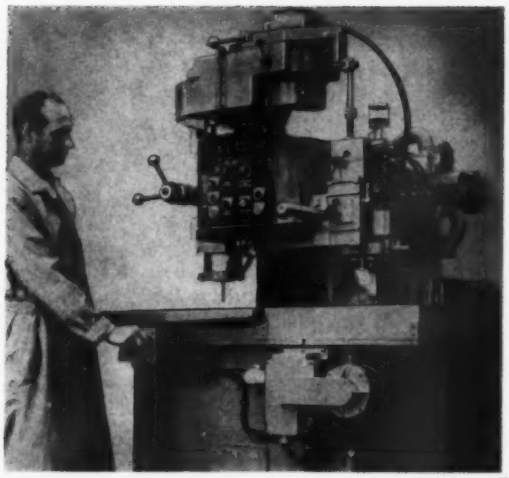
Geo. T. Schmidt, Inc., will have Model 10T pneumatic impact bench press set up to mark hex nuts. It features fast setup without downtime for further adjustment and production rates of 3000 to 3600 pcs/hr. Stop at Booth 147, or Circle Inform-A-Gram No. F7.

• Inspection Instruments

National Electric Instrument Div'n of Engelhard Industries, Inc. will show a wide variety of Borescope inspection instruments. Used to inspect interior surfaces, instruments from 0.095" to 1" will be shown at Booth 2144. For details, Circle Inform-A-Gram No. F8.

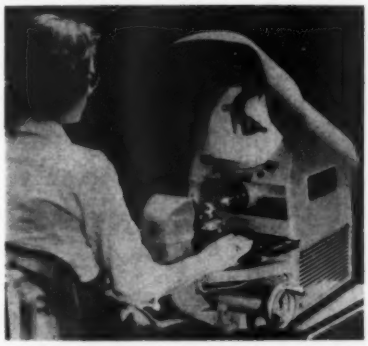
• Hole Location Gage

The Con-Check gage permits checking hole location and concentricity without turning your hand or the gage handle, and reading the indicator directly. Rotating the knurled thumbknob rotates the contact point. It's available from 0.150" to as large as required. Stop at Mayes Tool Co's Booth 568, or Circle Inform-A-Gram No. F9.



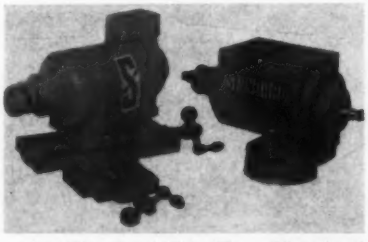
• Optical Comparators

A number of optical comparators and measuring machines will be operating at the Jones & Lamson Machine Co. booth. New Model TC-



10 has a 10" screen, and accommodates 8" x 10" overlay charts with eccentric chart holders in either the vertical or horizontal position (pictured). See the line at Booth 1208, or Circle No. F10.

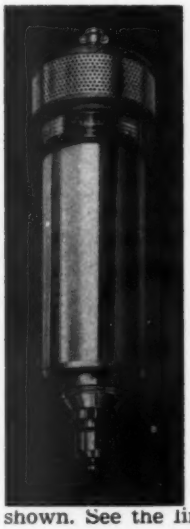
• Precision Spindles



At Booth 1430 The Standard Electrical Tool Co. will show their line of Super Precision spindles. The spindles and the line of attachments can be arranged in numerous combinations to fit job requirements. See them, or Circle Inform-A-Gram No. F11.

• Automatic Profiler

Especially designed for 360° profile milling under tracer control is the Magnatrace automatic profiler, sold by Pratt & Whitney for New England Machine & Tool Corp. It will be shown by P & W at the show, and operates by following an easily prepared sheet steel template. Roughing isn't necessary on many jobs, and finishing cuts are completed in a single pass. See it, or Circle Inform-A-Gram No. F12.

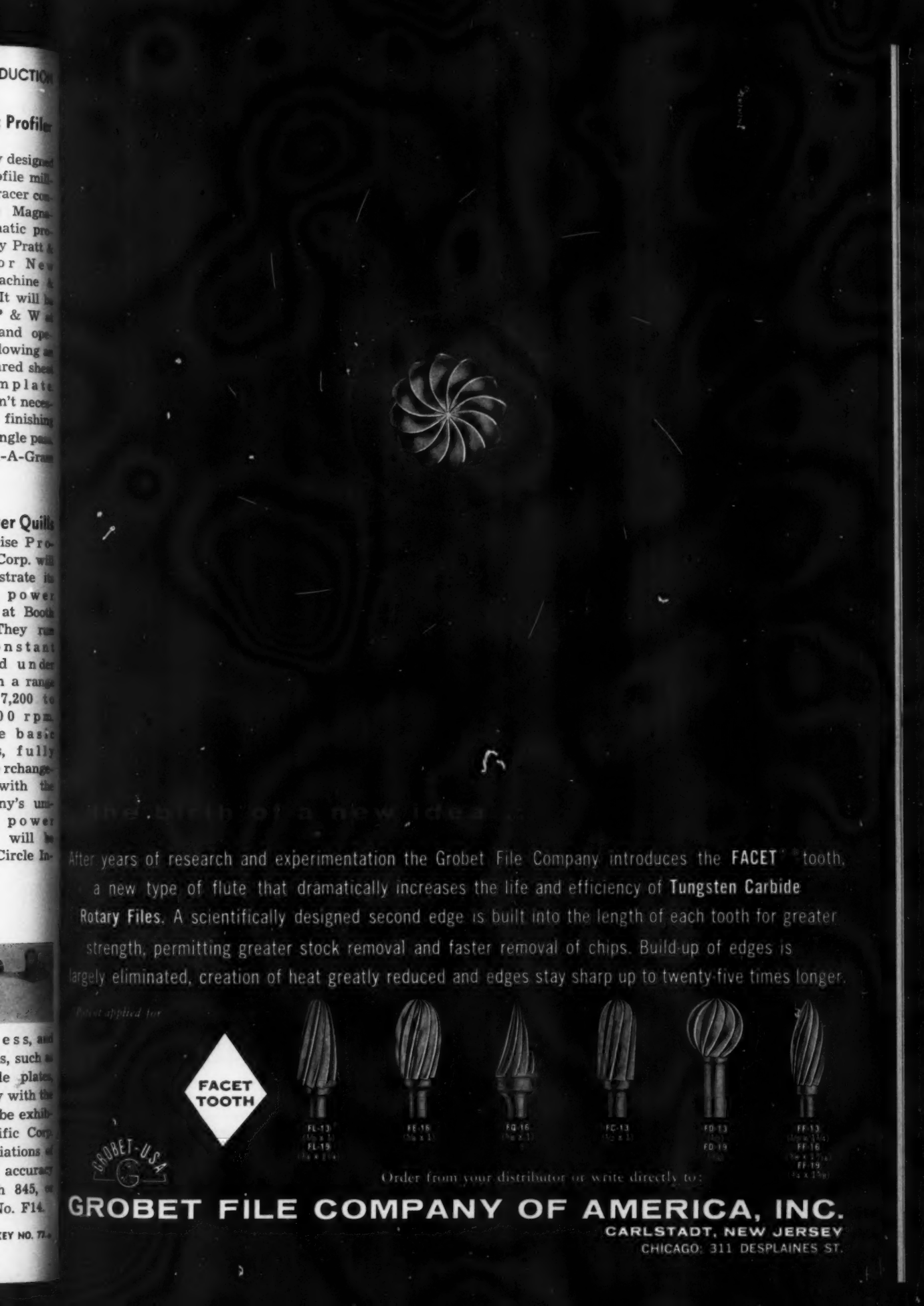


• Power Quills

Precise Products Corp. will demonstrate its new power quills at Booth 127. They run at constant speed under load in a range from 7,200 to 54,000 rpm. Three basic models, fully interchangeable with the company's universal power quills, will be shown. See the line, or Circle Inform-A-Gram No. F13.

• Checks Flatness

Flatness, straightness, and squareness of large planes, such as surface plates and angle plates, can be checked accurately with the M550 Autocollimator, to be exhibited by Gaertner Scientific Corp. It measures angular deviations of as much as 10 min to an accuracy of 1/2 sec. It's at Booth 845, or Circle Inform-A-Gram No. F14.



...and breath of a new idea

After years of research and experimentation the Grobet File Company introduces the **FACET** tooth, a new type of flute that dramatically increases the life and efficiency of **Tungsten Carbide Rotary Files.** A scientifically designed second edge is built into the length of each tooth for greater strength, permitting greater stock removal and faster removal of chips. Build-up of edges is largely eliminated, creation of heat greatly reduced and edges stay sharp up to twenty-five times longer.

Patent applied for

FACET TOOTH

FL-13 FL-19 | FE-15 | FQ-16 | FC-13 | FD-13 FD-19 | FF-13 FF-16 FF-19

GROBET-USA

Order from your distributor or write directly to:

GROBET FILE COMPANY OF AMERICA, INC.

CARLSTADT, NEW JERSEY

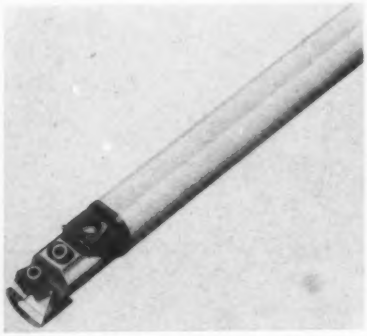
CHICAGO: 311 DESPLAINES ST.

• Ball Bearing Die Set

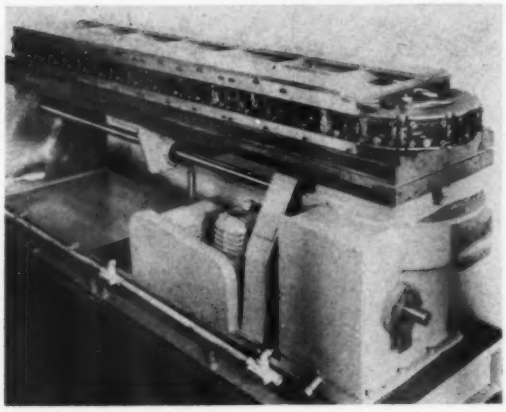
Eight exclusive features are found on the ball bearing die set that will be shown by The E. W. Bliss Co. at the show. It assures positive alignment of punches and dies, helps eliminate burred parts, reduces rejects, and extends the life of dies between regrinds. And, it's easy to assemble and take apart. See it at Booth 1034, or Circle Inform-A-Gram No. F15.

• Head K-Bars

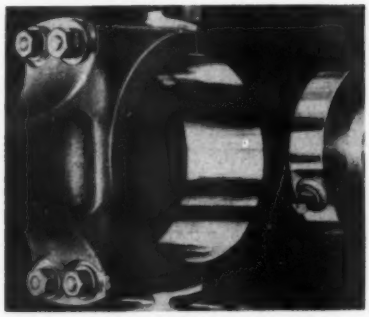
Stiffness of new Style BB-5000 K-Bars from Kennametal, Inc., prevents taper, weaving, and drag-



out scoring on precision boring operations. They come in seven diameters from 1" to 2½". Get details at Booth 1004, or Circle Inform-A-Gram No. F16.



• Tough Adjustable Tooling



Titanium carbide and ceramic tipped Microbore adjustable tooling, all cone relief ground to gage room accuracy, will be featured by DeVlieg Machine Co. See it at Booth 427, or Circle No. F17.

• Indexing Chassis

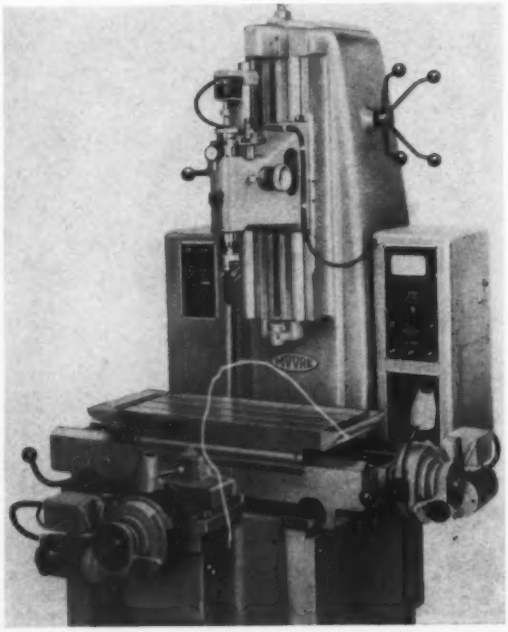
Complete with drive and overload clutch, Model ST-A18 conveyor indexing unit is available with 27, 35, 43, or 51 work carriers. Indexing takes place during 120° of rotation of the cam shaft, while the remaining 240° is used for dwell. Special drive and timer can be furnished for a machine requiring more than 240° dwell. It's from Standard Tool & Mfg. Co., and can be seen at Booth 1838, or Circle Inform-A-Gram No. F19.

• Bore Gage Series

A three point centralization system featured on Alina's bore gages quickly and accurately locates the gage in the hole. They swiftly reveal taper, bell mouth, out-of-round, and other variations, and are available for measuring depths up to 40". See this series of Alina Corp. at Booth 1608, or Circle Inform-A-Gram No. F20.

• Dial Assembly Press

Designed for assembly, staking, riveting, pressing, and forming, this automatic dial assembly press will be exhibited by Precision Detroit Co. This model has a range up to 6 tons and can be furnished with 6, 8, or 12 stations. Get details at Booth 661, or Circle Inform-A-Gram No. F21.



• Universal Measuring Machine

Designed to provide ultra-fine precision measurement and exacting inspection standards, Model 3 universal machine is able to measure to one-third of a tenth—ideal for measuring large workpieces to laboratory tolerances. Stop at Booth 1105 to see Moore Special Tool's display, or Circle Inform-A-Gram No. F18.

JONES & LAMSON MACHINE COMPANY

the man who needs a new machine tool is already paying for it

THE WALL STREET JOURNAL, Thursday, February 4, 1960

NOUNCEMENT

This advertisement merits the attention and discussion of every executive in management, production and finance

TO COMBAT THE SERIOUS LOSS OF PROFIT
TO INDUSTRY CAUSED BY $10 BILLION
WORTH OF ECONOMICALLY OBSOLETE
PRODUCTION EQUIPMENT
A TOP MACHINE TOOL PRODUCER ANNOUNCES
A REVOLUTIONARY LEASING PLAN
REQUIRING NO CAPITAL OUTLAY...
NO PURCHASE OPTION OR OBLIGATION...
AT HALF OF TRADITIONAL LEASING RATES...
AND WHICH IS TOTALLY PAYABLE OUT OF
"PROFITIVITY."

With this lease, the customer can put a $30,000 lathe on his payroll for just $3.50 per hour on an 8-hour single shift basis—only $1.25 per hour on a two-shift basis—and lease may be renewed at one-third the original rate... figures down to 80¢ and 40¢

THE CASE: American industry is heavily ... economically obsolete ... unable but seriously ... a ... to the ...

THE CAUSE: ...

THE C...

This announcement appeared in *The Wall Street Journal* on February 4. Among industrial management people, it is one of the most talked-about announcements in recent years.

The headline tells the story in brief. For complete details and a reprint of the full text of *The Wall Street Journal* advertisement, write or call today. And remember . . . *The man who needs a machine tool is already paying for it.* Now he can pay for it entirely out of increased profits earned through new high-productivity equipment under the no-capital-outlay PROFITIVITY LEASING PLAN.® Jones & Lamson Machine Company, 519 Clinton Street, Springfield, Vermont.

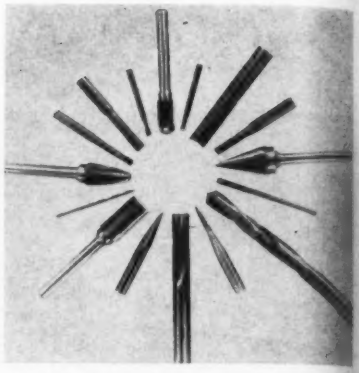
Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

CIRCLE INFORM-A-GRAM KEY NO. 79

• Deep Punching Press

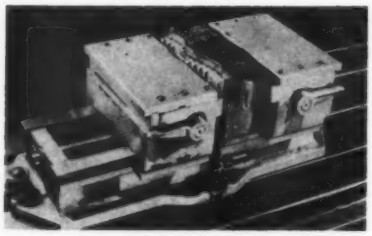
The new Super 30 Fabricator from Wales Strippit, Inc., is a single-station high speed punch press with a 30″ throat depth capacity. Hole punching capacity ranges from 3½″ in 16 ga mild steel to a ½″ hole in ¼″ mild steel, with a tolerance of ±0.005″. Stop at Booth 1221, or Circle Inform-A-Gram No. F23.

• Fluted Tools



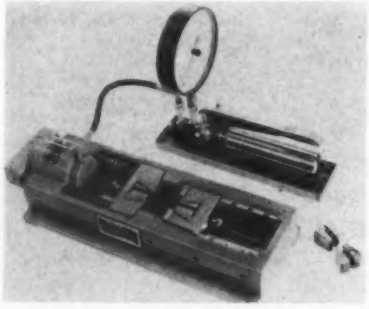
End mills, burs, reamers, drills, and other fluted tools will be featured by Kennametal, Inc. Their high rigidity and strength distributes the cutting load evenly to give accurate cuts and better finishes on titanium alloys, stainless and heat-treated steels up to Rc 60 and higher. For details, stop at Booth 1004, or Circle Inform-A-Gram No. F27.

• Contour Grip Fixtures



Contour Grip fixtures, which mold their grip to any shape, can be actuated hydraulically, pneumatically, or through solenoid valves, and can be synchronized with the operation of any machine tool. They'll be featured by The E. W. Bliss Co. at Booth 1034, or Circle Inform-A-Gram No. F22.

• Tensile-Testing Featured



A new line of tensile-testing machines, plus units that permit hardness and ductility testing to be incorporated into automatic production lines, will be offered by Steel City Testing Machines, Inc. For details, stop at Booth 1526, or Circle Inform-A-Gram No. F24.

• Bearings and Ball Screws

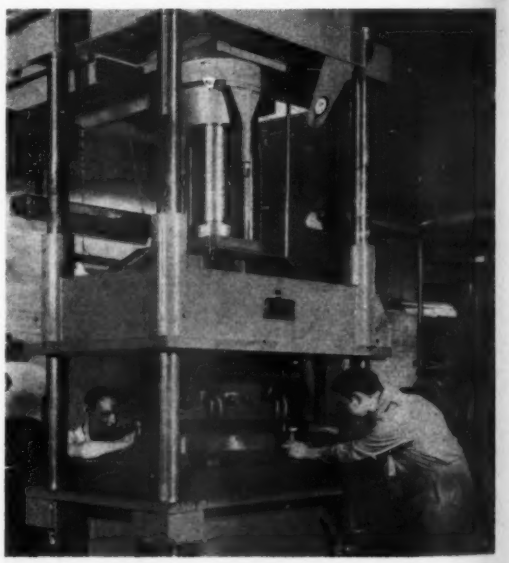
Recirculating anti-friction Tychoway bearings and Super-Cision ball screws are ideal for supporting machine components moving in a straight line and for positioning them with a minimum of mechanical force. Scully-Jones and Co. is showing them at Booth 1127, or Circle No. F25.

• Standard End Mills

Visitors at Booth 1239 will see additions to the Eclipse Counterbore Co. line of standard end mills. Sizes include up to 2½″ dia in various styles; 2-flute single-end in stub, medium, and long lengths; and 4, 6, 8-flute single-end in various lengths. For details, Circle Inform-A-Gram No. F28.

• Die Try-Out Presses

Perform tests during various stages of die production—from early development work until samples are produced with the finished die—with Dake Corp.'s die try-out press. Nine standard models from 25- to 300-ton capacities, all have easy accessibility to all four sides of the die. See it at Booth 1730, or Circle Inform-A-Gram No. F26.



JONES & LAMSON "AUTOMATION"

the man who needs a new machine tool is already paying for it

Numerical Control . . . what's it worth?

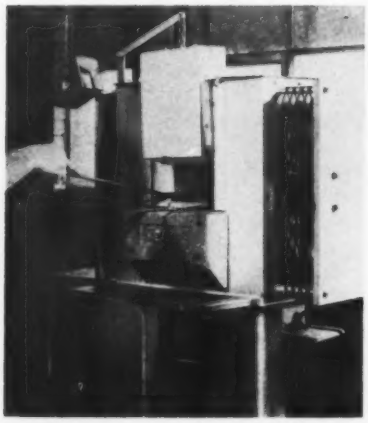
What *about* numerical control: is it all it's cracked up to be? The answer, in a word, is "yes". Here's why. With numerical control, the *big* factor is *flexibility*. Tape or numerical programming can be employed economically for medium or small lot production, even down to *single pieces*. Accuracy is also increased. For instance, Jones and Lamson tape controlled positioning units hold tolerances of ±.001 on applications for punching, drilling, boring or similar operations where point-to-point positioning is mandatory. Machine set-up and change-over become primarily an office procedure. Numerical control of machining operations eliminates the need for cams, templates, even prototype parts and special fixtures. It results in greater machine utilization, and speeds actual machining. Lead time is reduced, and because human error is largely eliminated, accuracy is improved.

Any way you look at it, numerical control has come of age. It's being used more and more, simply because it produces better, at lower costs. For detailed information, write Jones & Lamson Machine Company, Dept. 710, 519 Clinton Street, Springfield, Vermont.

Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

CIRCLE INFORM-A-GRAM KEY NO. 81

• New Electric Furnace



Scale-free, decarburization-free hardening of "moly" high speed steel is possible with the new Model Y electric furnace. Positive, protective atmosphere for high carbon, high chrome, or high speed steel is created within the work chamber. It will be at The Sentry Co's Booth 2027, or Circle No. F29.

• Tool Steels Data

The display at Latrobe Steel Co.'s Booth 442 will include tools and dies made of desegatized tool steel, along with a tool steel technical information center for solving problems connected with tool steels. See the display, or Circle Inform-A-Gram No. F30.

• Gear Cutting Tools

The Fellows Gear Shaper Co. is showing gear cutting tools and gear measuring instruments at Booth 544. A 12M involute measuring instrument, equipped with a high-speed recorder, will be demonstrated and a No. 4 fine-pitch Red Liner with 1600:1 magnification will show a complete check of precision master gears. Circle Inform-A-Gram No. F32.

• Deburring Device

By slipping a Burr-Bit on any make tap, the hole is deburred as the tap is withdrawn, eliminating a second operation. They're made to fit 2- and 4-flute taps from #2 to 1¼", and 3-flute taps from #2 to ½". A new line fits pipe taps. Vernon Devices, Inc., will show the Burr-Bit at Booth 946, or Circle Inform-A-Gram No. F33.

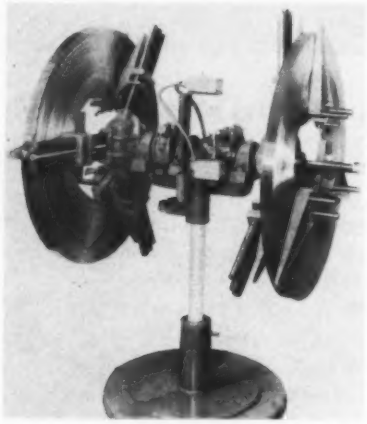
• Standard Equipment

Ferguson Machine Corp. of Indiana will emphasize standardization in machine components and machinery, including automatic assembly and mass production equipment. Cams, power transmission systems, and standard placing stations will be featured at Booth 1461. For details, Circle Inform-A-Gram No. F35.

• Adjustable Facing Heads

New Microface adjustable blade facing heads from DeVlieg Machine Co. fit boring machines, turret lathes, and heavy drilling machines. They can face or spot-face surfaces from 1½" to 8½" dia without additional special tooling. Their dovetail blade holder mounting in a one-piece head eliminates chatter. See them at Booth 427, or Circle Inform-A-Gram No. F36.

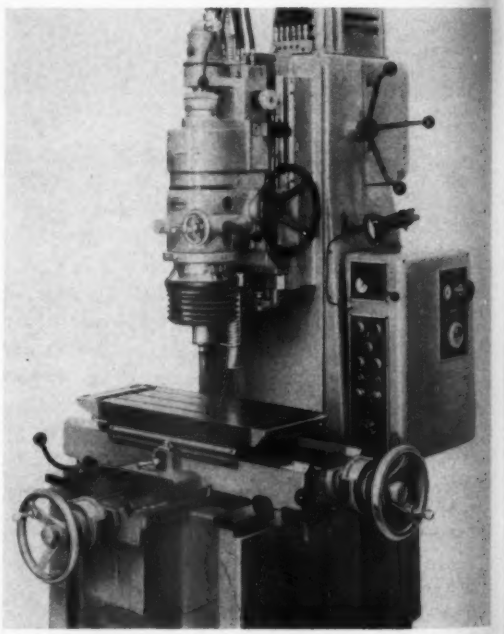
• Double Stock Reel



To be seen at the exhibit of Durant Tool Supply Co. at Booth 339 is its line of pressroom equipment. Illustrated is the double stock reel. Stop at the booth for details, or Circle Inform-A-Gram No. F31.

• Precision Jig Grinder

Finer tolerances, and greater range and larger table are features of Model 3 jig grinder, to be presented by Moore Special Tool Co., at Booth 1105. It grinds, with split-tenth accuracy, straight or tapered holes, and regular or irregular contours to size and location after hardening. Circle Inform-A-Gram No. F34.



JONES & LAMSON MACHINE TOOLS

the man who needs a new machine tool is already paying for it

Brand-new! A fully automatic tracing lathe

This new J & L Model 30 Fully Automatic Tracing Lathe combines a number of flexible designed features, *and it's competitively priced.* The basic J & L ingredients of extra ruggedness and extreme precision are apparent throughout. (Note the unusual solidness of the tracing slide, for instance.) Specifically, it offers 1. *Fast and flexible set-ups* which are extremely simple, and accessible to the operator, 2. *Compact and convenient controls* for push-button programming of the automatic cycle, 3. *Automatic speed and feed changes* during a cut, 4. *Work handling facilities* that can be either automatic or manual (there's plenty of room for chip disposal, too).

In addition, this machine will accommodate any one of three different rear slides. It also offers a choice of two different headstocks. Moreover, the stylus and template are high and dry.

Details and specifications are contained in our brochure No. 5810. Write for your copy. Jones & Lamson Machine Company, 519 Clinton Street, Springfield, Vermont.

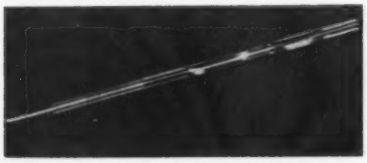
Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

CIRCLE INFORM-A-GRAM KEY NO. 83

• Ceramic Bushing

Among the items to be exhibited by American Drill Bushing Co. is the Ceram-A-Grip bushing for use in plastic tooling. It's coated with a thin shell of ceramic material to insulate against frictional heat build-up. See these and other drill jig bushings at Booth 1309, or Circle No. F37.

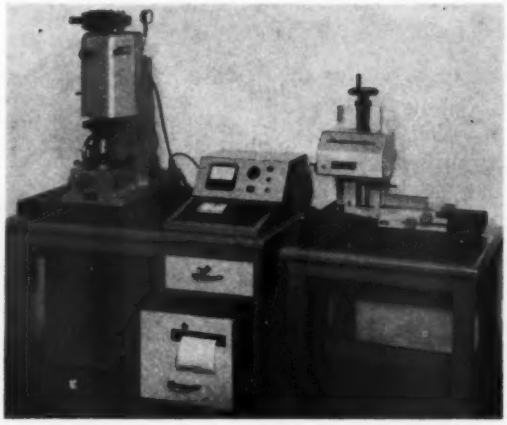
• Hole Shrinker



The Besly-Welles Corp.'s Reducto tool that shrinks oversize holes, up to 0.005″ in cast iron and 0.015″ in more ductile materials, will be featured at Booth 738. As the tool passes through the work it first reams the hole to a calculated oversize, then reduces the bore, and finally resizes by reaming off the crests of the threads formed. Circle Inform-A-Gram No. F38.

• Low-Cost Shop Press

Rapid ram approach, variable ram speed, and movable workhead are features of Dake Corp.'s new Elec-draulic press. It's available in 50, 75, and 150-ton capacities. Stop at Booth 1730 to see the 75-ton model, or Circle No. F39.

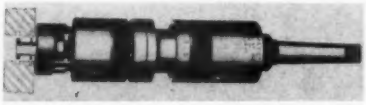


• HD Hydraulic Cylinder

The S-P Mfg. Corp. is displaying an interchangeable heavy-duty high-pressure hydraulic cylinder that's available in 12 bore sizes, from 1⅛″ to 12″. It's for 2000 psi (3000 psi non-shock) operation, with 23 mounting styles and four different rod ends. Stop at Booth 1516, or Circle No. F40.

• Recess Tool Holder

Bokumatic recess tool holders with quick change adapters will be presented by Bokum Tool Co., Inc.



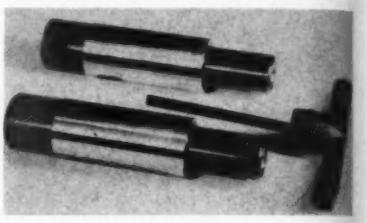
They're used on standard drill presses, radial drills, turret lathes, and special machines, and will be exhibited at Booth 831. For details, Circle Inform-A-Gram No. F41.

• Linear Recorder

Permanent records of the shape, height, and spacing of surface irregularities are provided by the linear Proficorder (right). This setup made up of tracer, pilotor, and amplicorder, records long waves, bows, and non-symmetrical profiles such as steps, plateaus, and grooves. See it at Micrometrical Mfg. Co's, Booth 305, or Circle Inform-A-Gram No. F42.

• Expanding Mandrels

These hydraulic expanding chucking tools hold parts and tools during turning, grinding, and inspection operations. An extremely rigid and accurate shrink fit between tool and part being held is provided. See them at Booth 1127, write Scully-Jones & Co. for details, or Circle Inform-A-Gram No. F43.



• Power Shear

Model 48 power shear, with inclined ram and 14 ga mild steel capacity over a 50″ cutting length, will be introduced by O'Neil-Irwin Mfg. Co. at Booth 805. Cutting speeds up to 160 strokes/min are possible. Circle Inform - A - Gram No. F44.

• Coolant Filter

The new Hoffman H-Flo Vacu-Matic filter's paper filter medium handles water soluble coolants at from 200 to 2500 gpm. It indexes automatically and separates spent filter paper, coolant sludge, and chips mechanically. Filtering is continuous with the sorting of paper from scrap eliminated. U. S. Hoffman Machinery Co. is showing it at their booth, or Circle Inform-A-Gram No. F45.

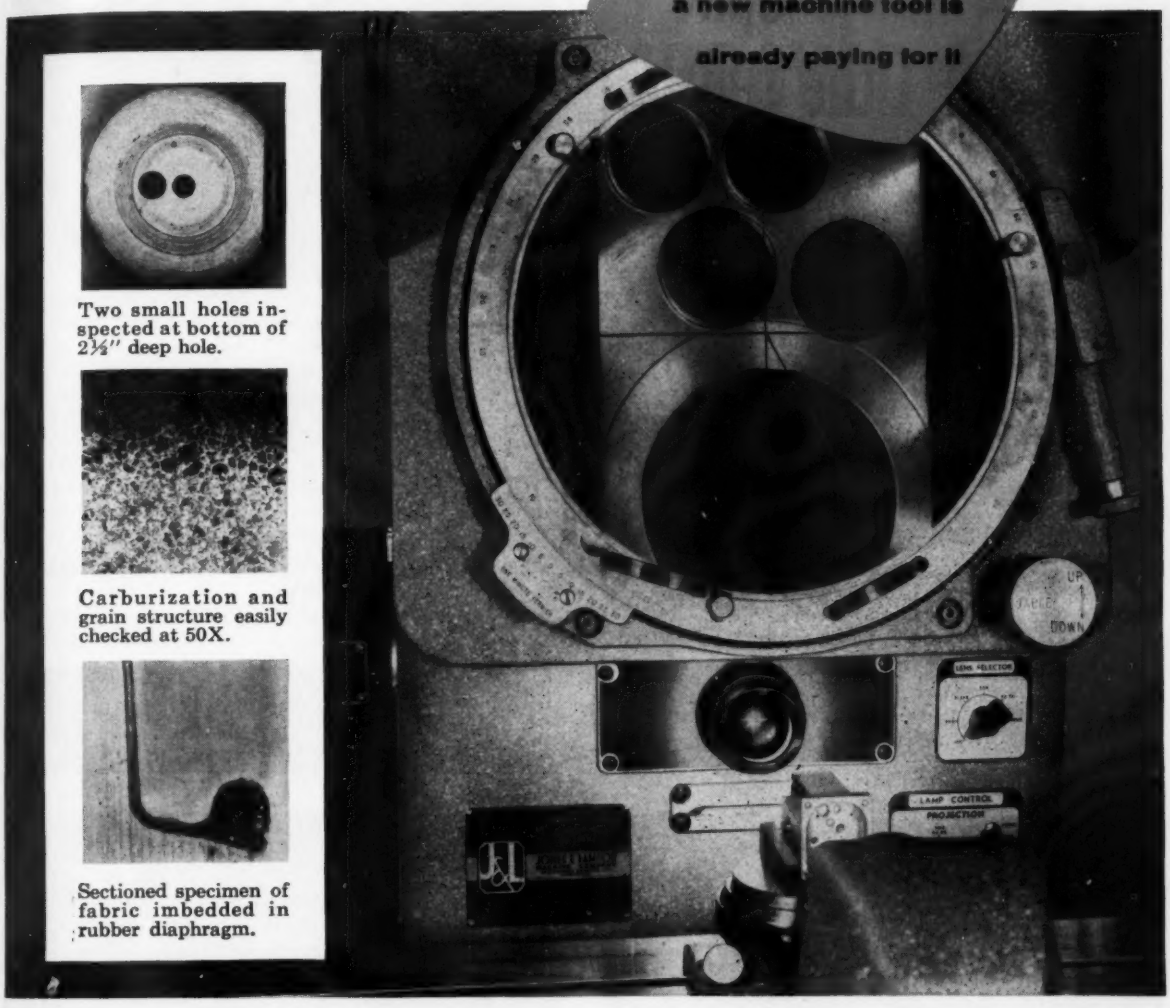
JONES & LAMSON OPTICAL COMPARATORS

the man who needs a new machine tool is already paying for it

Two small holes inspected at bottom of 2½" deep hole.

Carburization and grain structure easily checked at 50X.

Sectioned specimen of fabric imbedded in rubber diaphragm.



New reflection unit makes "tough" inspections easy

Now, users of J & L FC-14 and TC-14 Optical Comparators can easily and accurately inspect cast materials, deep holes, and penetration of heat treat, and can make their over-all inspection operations more efficient than ever before.

J & L's new Normal Reflection Unit, shown here, is designed to produce the maximum amount of reflectivity, *regardless of the surface finish of the part being inspected.* This new unit gives brighter-than-lifelike images, with clean, razor-sharp definitions, without heat and without distortion.

This revolutionary development makes it possible to inspect by reflection and by projection simultaneously. Reflection can be directed from above, below, or either side. Effective light is increased at least 55% by means of a spherical reflector, which concentrates and redirects light into the optical system.

With J & L's True Telecentric Lens System, depth of focus of up to .100" can be obtained. And the image does *not* change size during focusing! The entire unit, is externally mounted to isolate convected heat from the optical system.

Write for free, illustrated folder LO-5918. Jones & Lamson Machine Company, 519 Clinton Street, Springfield, Vermont.

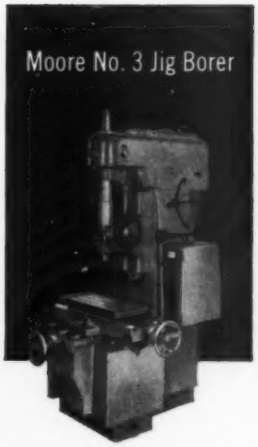
Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

CIRCLE INFORM-A-GRAM KEY NO. 85

"The No. 3's split the tenths!"

Visit us in Booth 1105 at the ASTE Show

So report users of Moore's New Jig Borer and Jig Grinder



You will easily break the "tenth" barrier with this accurate machine. No gibs...no overhang...improved drive ...speed range of 60 to 2250 RPM...11 x 24" table working surface. It bores, drills, reams and spots holes in dies, jigs and production parts with unequalled speed and accuracy.

With this new, larger No. 3 model, you can grind—*with split-tenth* accuracy—holes plus regular and irregular contours to size and location after hardening. Faster strokes are provided for chop-grinding... infinite spindle speeds, 40 to 250 RPM...larger table working surface, 11 x 24".

All hardened, ground and lapped ways. Made and calibrated to the new international inch.

Write today for literature describing the many advantages of the No. 3 Moore Jig Borers and Jig Grinders.

"Our operators feel that these are the best machines they have ever worked on. They take care of the tenth-splitting tolerances required by industry today. Over the years we have enlarged our Moore Jig Boring and Jig Grinding Department to 15 machines." These are the words of Herbert Harig, President (left above), and Karl Harig, Chairman (at right), Harig Manufacturing Corporation, Chicago, Illinois.

MOORE SPECIAL TOOL COMPANY, INC.
300 Union Avenue, Bridgeport 7, Conn.

Among the highly skilled toolroom operators in the Federal Products Corporation, Providence, Rhode Island, is this talented jig grinder operator, Mrs. Florence Smith. Mrs. Smith achieves ultra-precise results with the No. 3 Moore Jig Grinder.

"We have found that it costs real dollars and cents to operate without Moore equipment. This cost factor is just one of many reasons why we recently added the new Moore Model No. 3 Jig Grinder. This Machine, with its tenth-splitting accuracy, hardened ways and wider range, enables us to service more customers better." Statement by Val Koller, President, Koller Die & Tool Co., Milwaukee, Wisconsin.

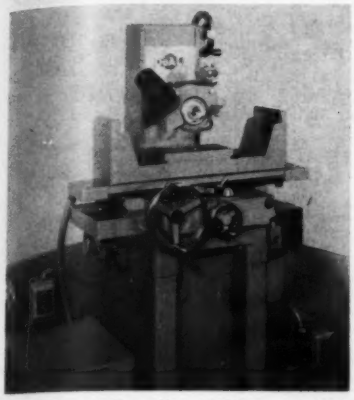
HOLES, CONTOURS AND SURFACES, Moore's authoritative book, tells how to produce tools, dies and precision parts the modern way. 424 pages, 495 illustrations. $5 in U.S.A., $6 elsewhere.

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

CIRCLE INFORM-A-GRAM KEY NO. 86

• Versatile Grinder

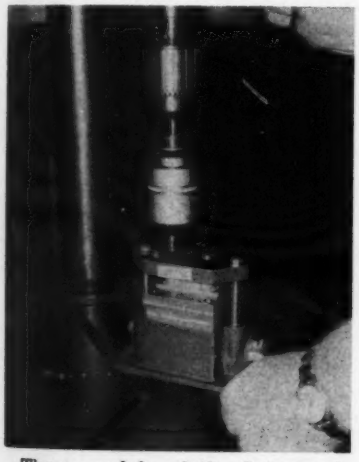


With hydraulic table control available as an attachment, this grinder fits both the job and operator. Manually or hydraulically, it can double either toolroom or production runs. A new angle-cutting power saw, stainless steel gage blocks, double-faced black granite surface plates, and cutting tools and gaging instruments will also be displayed at The DoAll Co.'s Booth 1226. Circle Inform-A-Gram No. F46.

• Grinding Equipment

Carbide and steel dies, surface grinders, and the improved Grind-All fixture will be shown by Harig Mfg. Corp. at Booth 1045. Stop at the booth, or Circle Inform-A-Gram No. F47.

• New Internal Tool



Three models of the Intramatic tool will be introduced at the Show by Nobur Mfg. Co. For internal grooving, recessing, and back spot-facing, they're capable of performing heavy cutting operations. Stop at Booth 2235, or Circle No. F48.

AMPCO®

Ampco® announces a

NEW, IMPROVED ALLOY

for drawing and forming stainless steel

DiBronze

(PATENT PENDING)

Longer life between dressings. Improved machining qualities. Better impact resistance.

Now in stock — cast rectangles, solid rounds, centrifugally cast die blanks up to 20" diam.

Also cast to your required shape.

Write for bulletin today.

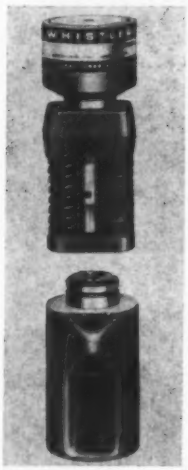
AMPCO METAL

AMPCO METAL, INC.
Dept. 54D
Milwaukee 46, Wisconsin
West Coast plant: Burbank, Calif.
Southwest plant:
Garland (Dallas County), Texas

D-790

CIRCLE INFORM-A-GRAM KEY NO. 87

• Punch-Die Retainers

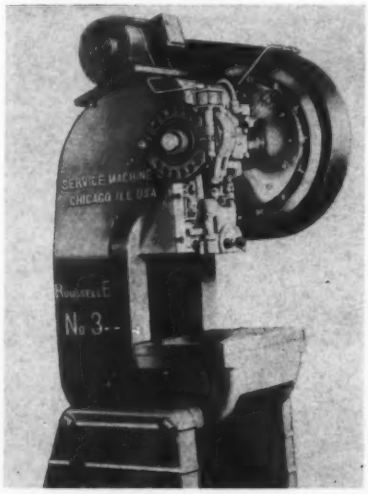


Cut punching operations in half with the new punch and die retainer units for Magna-Dies, developed by S. B. Whistler & Sons, Inc. They'll be demonstrated for the first time at Booth 1339. Magna-Die Catalog M-60 details the line, stocked in increments of 0.001" from 0.100" through 0.500" dia. with larger sizes available. Circle No. F49.

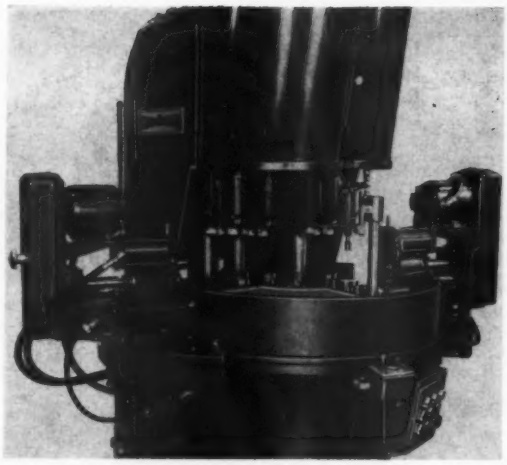
• Dial Thread Plug Gage

Go and no go inspection can be performed in one operation, using Mahr's dial thread plug gage that employs three measuring jaws representing master thread gages. One is retractable between the other two. It's being shown at Mahr Gage Co.'s Booth 130, or Circle Inform-A-Gram No. F50.

• Punch Press Line

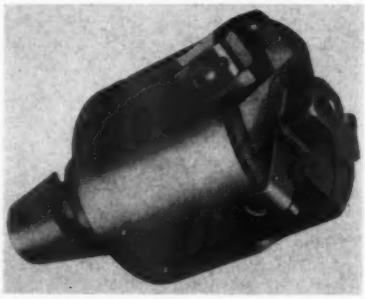


One of the Rousselle punch presses to be exhibited by Service Machine Co. is Model 3 OBI press, equipped with electrically controlled Econo-Air friction clutch. All 5- to 40-ton models are designed to provide high, uniform output and to keep die wear down to a minimum. Stop at Booth 1722, or Circle Inform-A-Gram No. F51.



• Precision Boring Cutter

On display at the Valenite Metals booth will be KamSet precision boring cutters that provide boring accuracy to tenths, individual car-



tridge adjustment for initial tool setting, and instant "Kam" adjustment to compensate for insert cutting edge wear. See this cutter at Booth 1209, or Circle Inform-A-Gram No. F52.

Want Tool Show Product Data?
Circle IAG Numbers.

• Index Tables

Two lines of index tables will be displayed by Precision Detroit Co. Both are for assembling or ma-

chining operations and PDC-JIC Series (illustrated) comes with up to 60" dia. See them at Booth 661, or Circle No. F53.

• High Production

A multiple-spindle automatic secondary operation machine will be displayed by Standard Tool Mfg. Co. at Booth 1838. It has a horizontal five-station index table, three vertically-mounted spindles, each performing its own operation at a given work station, and two swivel-mounted horizontal spindles to perform additional operations on screw machine products. See Model 10-902, or Circle No. F54.

• Recessing Tools

Increase versatility of drill presses and radial drills for low-cost, fast, and accurate grooving, necking, chamfering, and recessing operations with Scully-Jones & Co.'s recessing tools. They'll be shown at Booth 1127, or Circle Inform-A-Gram No. F55.

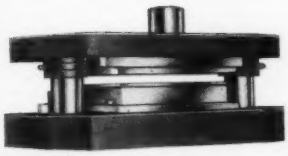
• Die Assembler

Designed for pulling apart upper and lower die assemblies, Model 1 portable die assembler will be on display at Booth 1144. It simplifies aligning of punches to dies, mating of die components during the initial stages of die manufacturing, and speeds repair work. Visit The Producto Machine Co., or Circle Inform-A-Gram No. F56.

Needles are cut and twisted at the rate of 1,960 per minute.

150 MILLION STROKES

WITH ONE SET OF PINS AND BUSHINGS!



Danly precision, all-steel, center-post die set protects this valuable high-speed die for Regal Electronics Company, Chicago

Aluminum foil strip, six inches wide and .003″ thick, is blanked and formed into two 3-inch strips of curled and twisted "Sapphire" Christmas tree needles at *980 strokes per minute!* To maintain required .0005″ punch-and-die clearance and take ¾″ strokes at this "motion-picture speed", Regal Electronics Company, Chicago, required true precision in a die set.

After 150,000,000 strokes in seven months of almost continuous operation, their Danly die set was still operating with its original Microme guide posts and demountable bronze-plated bushings!

Danly production methods consistently maintain the highest standards of die set precision through individual control of every critical dimension. Thousands of tool and die shops agree that the finest die set obtainable is usually the lowest cost insurance on any die-making investment. Find out how Danly precision can save money for you.

Write for our new folder on
"The Importance of Die Set Precision."
Lists and discusses all critical dimensions . . .
shows how and why consistent Die Set precision
is vital in every die-making operation.
Send for your free copy.

Branches and Distributor Assembly Plants in all Toolmaking Centers

DANLY

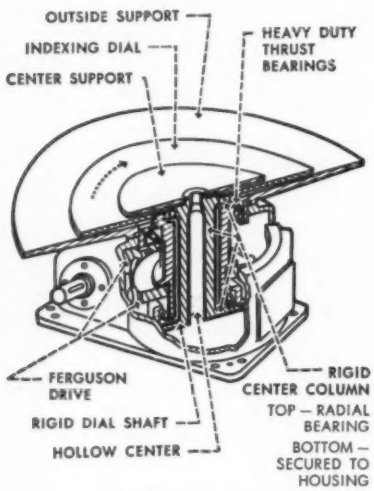
DANLY®

DANLY MACHINE SPECIALTIES, INC. / 2100 SOUTH LARAMIE AVE., CHICAGO 50, ILL.

How INDEX TABLE *DESIGN* Affects INITIAL PRICE and TOTAL COST

Study these drawings to see how the design of an index table affects total costs of an installation. Some tables may be priced lower than others initially, but the additional charges for auxiliary items to adapt them to production requirements, added to maintenance and downtime costs, can make a drastic difference in *the total price.*

FIG. 1—FERGUSON INTERMITTOR



The Ferguson Intermittor, indexed by a roller gear drive which operates a minimum of 8,000 hours at speeds up to 2,000 indexes a minute without maintenance, needs no auxiliary locking. It is designed for high speed operation and incorporates rigid integral supports for tooling to eliminate expensive segmental components. The Intermittor dial is supported by tapered roller thrust bearings to withstand heavy loads with little friction. A stationary center tooling support is held rigidly at its top by anti-friction radial bearings and at the bottom by a flanged base bolted to the housing. Hollow center of the support may be used for passage of coolants, fluids, air or vertical shafts to transmit motion to the work surface.

Figures 2 and 3 show typical barrel cam and geneva drive index tables. Their indexing mechanisms limit operating speeds, therefore other components may be "designed down." Shafts and bearings are lighter; frictional support surfaces might be employed instead of thrust bearings and an auxiliary locking or locating device is a costly necessity for even modest accuracy requirements. Tool mounting methods are often provided at additional expense and sometimes even ignored. Difficulties of installation and frequent maintenance downtime can increase total cost drastically.

FIG. 2—BARREL CAM TYPE

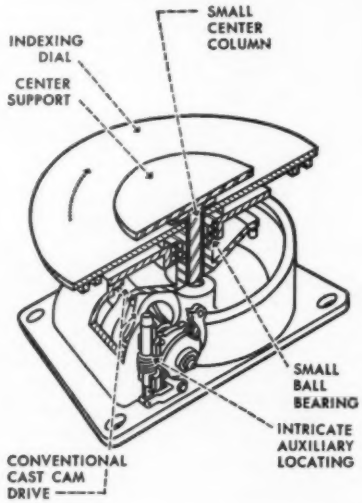
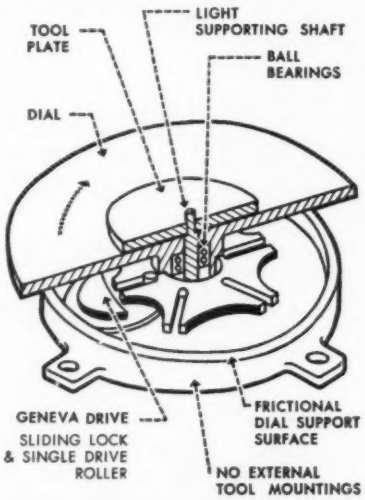


FIG. 3—GENEVA DRIVE TYPE



• SEND FOR CATALOG

Many other advantages result from the selection of a Ferguson Intermittor. Compare designs in new Catalog No. 160 which contains data on more than 175 standard tables. Every design engineer should have a copy. Get yours by writing:

Ferguson Machine Corporation
7818 Maplewood Industrial Court
St. Louis 17, Missouri

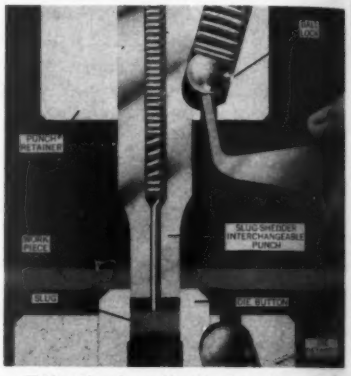
• Durable Dies

Brehm trimming dies will be displayed by Vulcan Tool Co. These durable dies can handle various sized shells drawn from sheet stainless steel, mild steel, copper, brass, zinc, and aluminum fiber. See them displayed at Booth 1254, or Circle Inform-A-Gram No. F57.

• Indexing Unit

The automatic cam-operated indexing unit from Standard Tool & Mfg. Co. provides accurate positioning for soldering, crimping, milling, drilling, and assembly. Model ST-A9A can reduce automatic machine design and construction time by as much as 50%. Index increments of 8, 12, 16, or 20 can be obtained during a complete revolution. See it at Booth 1838, or Circle No. F53.

• Slug-Shredder Punch



Effectively eliminate slug-pulling in any die, regardless of the type or thickness of the material being pierced, with these Slug-Shedder punches. Punches with round points are available in 1/16" to 5/8" dia. See them at Richard Brothers Punch Div'n, Allied Products Corp., Booth 1814, or Circle Inform-A-Gram No. F59.

• Tube Cutter

Vulcan Tool Co. will show a new machine, the Brehm tube cutter, at its exhibit. It reduces safety hazards such as whipping, while handling tubes up to 20' long and from ⅜" to 2¼" dia. One set of tool steel cutting adapters permits up to 4 million cuts, after sharpening and a 180° rotation of the cutting members. Stop at Booth 1254, or Circle Inform-A-Gram No. F60.

Thor

Everything you want in Multiple Nut Setters...

and more!

Speed production, multiply profit on any assembly of two to twenty-two nuts or screws. Thor multiples are custom engineered to your exact assembly situation. All fasteners are secured simultaneously to identical torque. Thor multiples can be engineered for any pattern, any product. Thor multiples are now in use in the assembly of such widely diversified products as floor mops and carburetors. Write today for Thor's complete automation manual on multiple fastener settings.

Thor Power Tool Company, Aurora, Illinois. Branches in all principal cities.

Thor POWER TOOLS

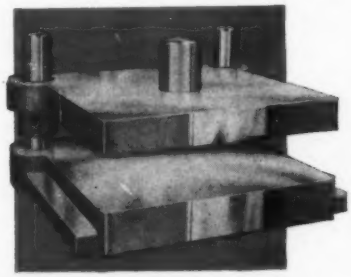
WE'LL SEE YOU IN DETROIT...

BOOTH 1439

THE *Exclusive* SET

Along about this time every year, we begin to travel. And, this year, there's no better place to go than to the A.S.T.M.E. Show . . . so we're on our way to Detroit, bag and baggage, with a lot of Superior exclusive die sets we want to show to all the A.S.T.M.E'rs.

Shhhhh! Can you keep a secret? We like tool and manufacturing engineers. Know why? Because they like Superior die sets — with the exclusive features. See Superior . . . the exclusive set! And we'll be seeing you!



Sue Perior and Spouse

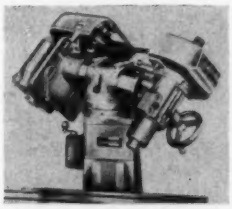
SUPERIOR STEEL PRODUCTS CORP.
2754 South 19th Street • Milwaukee, Wisconsin
Cheshire, Connecticut

CIRCLE INFORM-A-GRAM KEY NO. 92

"The Clausing is more accurate than vertical mills costing twice the price"*

So says Harold Meyers of the Meyers Machine Co., Grand Rapids, Mich. He goes on to say: "*and, we machine small parts up to 50% faster on our Clausing. You just can't beat it for small parts manufacturing.*"

The high precision spindle and drive have 7 ball bearings . . . hardened spindle. Ground and hard chrome plated quill has full length bearing in head.



The spindle head can be swiveled in a vertical plane and set at any angle, and turret rotated in a horizontal plane making it possible to machine at all angles with one set-up.

VERIFIED ACCURACY—Before it leaves the factory each CLAUSING MILL must pass rigid tolerance tests such as:

1. Top of table perpendicular to column ways within .0005" in 6" travel.
2. T-slots square with cross slide dovetails within .0005".
3. Table, parallel to turret within .001".
4. Spindle square with table, front to rear, within .001" T.I.R. in 5" circle.
5. Spindle taper (internal) runout within .0002" at spindle nose.
6. Table T-slots parallel to table dovetail ways within .0005" in 8" longitudinal travel.

Enthusiasm like this, on the part of CLAUSING users is virtually universal . . . points up the wisdom of getting *all* the facts concerning CLAUSING before buying *any* miller.

The Clausing is perfect for general production, pattern, experimental and tool room use. It is sensitive, versatile, accurate, easy to get around . . . highly efficient on *every* job using small cutters. And the price, too, spells economy:

ONLY $875 F.O.B. FACTORY

Write for Free Literature

SEE US AT BOOTH 1931
A.S.T.E. SHOW, DETROIT.

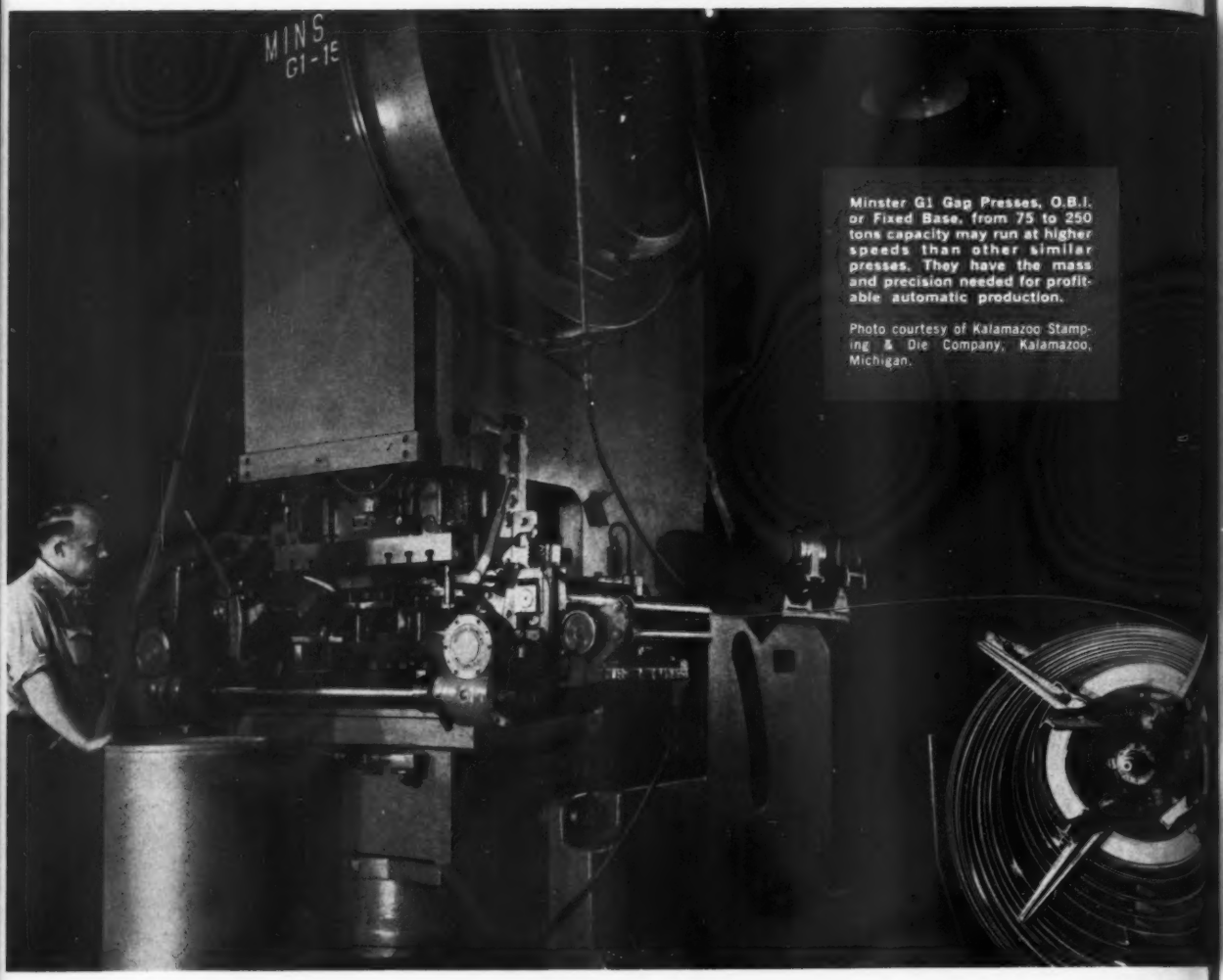
CLAUSING

CLAUSING DIVISION
ATLAS PRESS COMPANY
4-115 N. PITCHER STREET • KALAMAZOO, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 93

Eliminate expensive secondary press operations with

AUTOMATIC PRODUCTION



Minster G1 Gap Presses, O.B.I. or Fixed Base, from 75 to 250 tons capacity may run at higher speeds than other similar presses. They have the mass and precision needed for profitable automatic production.

Photo courtesy of Kalamazoo Stamping & Die Company, Kalamazoo, Michigan.

Minster Heavy Capacity Gap Presses with Feeds

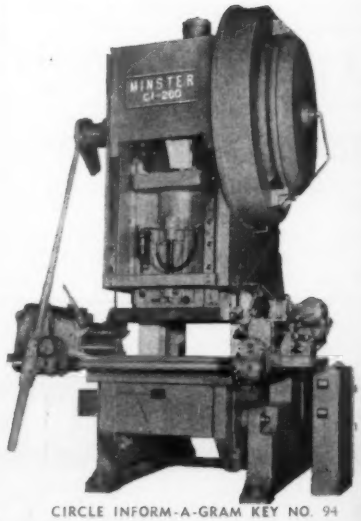
Progressive or compound die stamping jobs . . . long or short runs . . . are much more profitable when run automatically on the right Minster press with job-matched feed equipment.

Why pay for unnecessary rehandling of parts and storage space? Why tie up several presses when the job can be done faster and more accurately on just one press?

Minster offers a full range of presses and feeds plus technical knowledge and assistance to help you take full advantage of automatic production. Take a close look at your unit costs, then write or call . . .

The Minster Machine Company • Minster, Ohio

MINSTER®

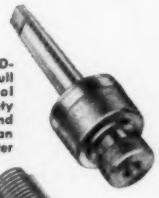


CIRCLE INFORM-A-GRAM KEY NO. 94

When you specify SEIBERT

HOLDING TOOLS you get

- ADVANCED DESIGN
- PRECISE WORKMANSHIP
- FINE MATERIALS
- QUICK SERVICE



FLOATING HOLDERS — provide full float, quick tool changes, a variety of shank types and sizes, including an adjustable adapter shank.

SPINDLE EXTENSIONS — provide individual spindle adjustment and extend or alter existing multiple setups without extensive retooling outlay.

DOUBLE-ACTION TAP DRIVERS — two tools in one. Used both as tension and compression type. Made in 6 adapter sizes from ½" to 1⅝".

SHUR-LOCK ADJUSTABLE ADAPTERS — built to GMC, Ford, Chrysler and ASA standards. Concentricity .002" TIR 6" from nose. Sturdy, dependable.

DRIVERS — hardened, ground, precision built, concentric within .002". Made to automotive, ASA standards. All types and sizes.

These are the money-saving advantages of Seibert Production Holding Tools. And because of them, an excellent reputation has been built for these tools in many mass-production plants throughout the country — automobile, truck, tractor, agricultural implement, earth-moving equipment, etc.

In addition these advantages have influenced prominent machine tool builders to specify Seibert Holding Tools when tooling up machines being furnished to mass-production plants. They know from experience that Seibert Tools will meet the most exacting requirements of their customers.

Improved machining and other production methods make possible the quantity manufacture of these production tools to precise tolerances from fine alloy steel without increased cost to the user. In addition, this efficient production provides for meeting the needs of the user with unusual promptness.

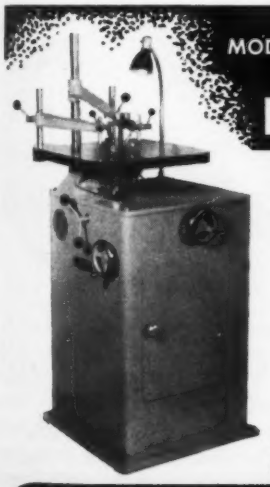
You can investigate the advantages of Seibert Tools by telling us your requirements. Complete data will be sent at no obligation to you.

SEIBERT

SEIBERT & SONS, INC. 1012 E. 24th STREET CHENOA, ILLINOIS

Quality MULTIPLE DRILL SPINDLES AND PRODUCTION TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 951



MODEL PDM **RICE** MILWAUKEE

PUNCH and DIE MAKER

The Complete Low-Cost Answer to Your Larger Die-Making Problems

- ★ Tilting Power Ram Permits Working from *Level* Table
- ★ Infinitely Variable Speed Transmission and Stroke Mechanism
- ★ Files Supported in both Upper and Lower Chuck . . . or in either
- ★ Saws to Center of 22½" Circle with Overarm, 28" with overarm removed
- ★ 20" square table — Special table available in 24" x 28" size

Send for PDM Bulletin, also Bulletins on Rice — Milwaukee Complete line of bench type Die Filers and Profile Grinders.

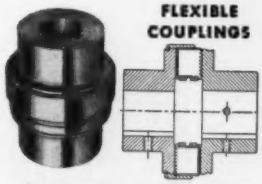
RICE PUMP & MACHINE COMPANY

228 PARK AVENUE BELGIUM WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 952

LOVEJOY POWER TRANSMISSION EQUIPMENT

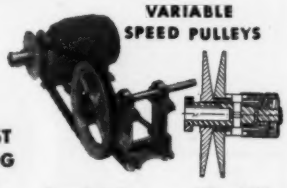
EASILY INSTALLED, MAINTENANCE-FREE



FLEXIBLE COUPLINGS

REQUEST CATALOG C-58

Bores (max.).....⅜" to 9½"
O.D. .....⅝" to 21½"
Wt. .....½ oz. to 1500 lb.
H.P. .....1/20 to 4250
Torque (static).1½ to 5100 ft.-lbs.



VARIABLE SPEED PULLEYS

REQUEST CATALOG P-58

Bores (max.).....½" to 1⅜"
O.D. .....3" to 13⅛"
Belt Sizes.....A to 2⅜ TW
Speed Ratios.....1-1 to 8-1
H.P. (1750 rpm.).....¼ to 15

UNIVERSAL JOINTS

REQUEST BULLETIN 820

Bores.....¼" to 2"
Hub Dia. .....½" to 4"
Static Torque 340 to 130700 in.-lbs.
H.P. (100 rpm.).....½ to 207

VERSA-MOUNT TAKE UP FRAME

REQUEST BULLETIN V-647

For All Pillow Blocks—Ball, Roller or Babbitted
Mount Top, Side, Inverted or Reverse-foot
Sizes ....½" to 2-7/16" Blocks
Travel lengths ..... 2" to 36"

Write for above literature today.

LOVEJOY FLEXIBLE COUPLING CO.

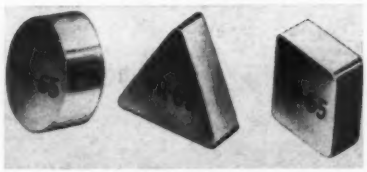
4859 W. Lake St., Chicago 44, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 953

• Hard Bronze Die Alloy

The newest hard bronze die alloy for low-cost drawing, forming, or bending operations, DiBronze, will be highlighted by Ampco Metal, Inc. No heat treating is needed for DiBronze, and it offers great toughness and improved impact resistance and machinability, while practically eliminating scratching, loading, and galling. See it at Booth 826, or Circle Inform-A-Gram No. F61.

• Cutting Tool Line



A complete line of cemented carbide and cast non-ferrous alloy blanks, tools, inserts, toolholders, milling cutter, and ceramic inserts will be found at Vascoloy-Ramet's Booth 1030. Featured will be VR-65 material, which extends the range of conventional carbides because it operates at speed and feed ranges between today's carbide grades and ceramic materials. Circle Inform-A-Gram No. F62.

CIRCLE INFORM-A-GRAM KEY NO. 96

• Rotary Profile Recorder

Surface irregularities including pits, flaws, waves, roundness, waviness, roughness, and total profiles can be measured and recorded permanently by the rotary Profi-corder. The tracer transforms the physical displacements of the stylus into electrical charges for recording. Micrometrical Mfg. Co. is displaying the recorder at Booth 305, or Circle Inform-A-Gram No. F63.

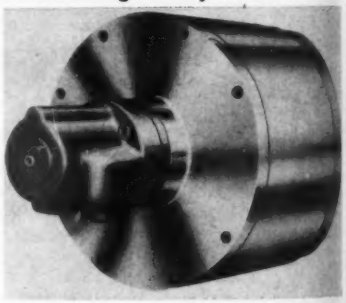
• Finishing Tool

Surface-finish and size holes, flat surfaces, contours, etc., with the Bearingizer tool from Cogsdill Tool Products, Inc. It gives surface finishes generally less than 10 micro-inches, and tolerances of 0.0002". Stop at Booth 306, or Circle Inform-A-Gram No. F64.

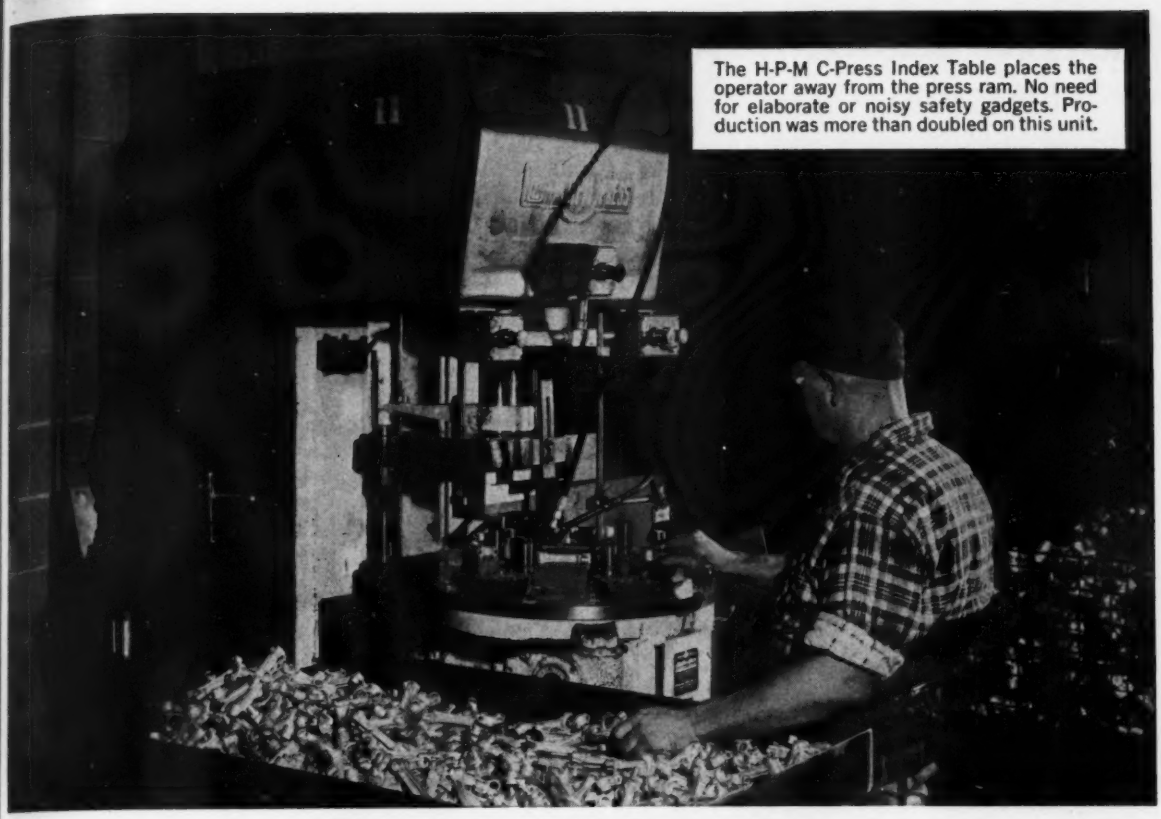
• Natural Diamond Grit

Highlighting the display of the Industrial Diamond Div'n, Engelhard Industries, Inc., will be SND natural diamond grit. Made up of needlelike particles, it increases grinding efficiency of resin-bonded wheels in certain jobs. See their diamonds at Booth 2144, or Circle Inform-A-Gram No. F65.

• Rotating Air Cylinder

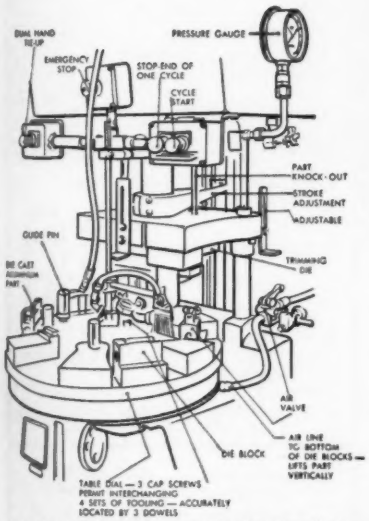


Designed for use at speeds up to 3600 rpm to actuate chucks and collets, Model RM rotating air cylinder will be on display by The S-P Mfg. Corp. Its double bearing inlet provides longer life at higher speeds and faster operating response. See it at Booth 1516, or Circle Inform-A-Gram No. F66.



The H-P-M C-Press Index Table places the operator away from the press ram. No need for elaborate or noisy safety gadgets. Production was more than doubled on this unit.

This H-P-M C-Press Can
TRIPLE DIE CAST TRIMMING PRODUCTION



Standard 15-ton C-Press with 6-station index table. 5-10-15-ton models with 8 or 12 station tables also available. A solid money-making investment for safer, faster die cast trimming for any shop.

Trimming die cast parts, the C-Press way, can show instant savings with the first day's use. Here's why: (1) The index table method allows operator to load fixtures while the press ram trims. No wasted waiting time. (2) The unit illustrated is set to index at 42 cycles per minute — more than twice the production formerly possible. (3) Saves time on tooling changes, too; four separate sets of fixtures for this C-Press table are mounted on individual table dials. To change a set-up for another part, the operator merely removes the dial and replaces with another complete set-up. (4) Automatic cycling; no treadles or buttons to push. (5) Automatic air ejection speeds removal of trimmed part from the fixture. It arrives at the loading station ready for another part.

SAFETY ASSURED WITH C-PRESS METHODS

The operator sits in front of the dial, away from the moving ram. The fixtures are loaded as they pass his station and are automatically indexed to the trimming station. His hands never reach the danger zone.

An investment in this type of operation is amortized in minimum time. Want to know more? Write or call H-P-M today. The coupon will assure complete information immediately.

The Hydraulic Press Mfg. Company, Mount Gilead, Ohio

Please send complete information on the H-P-M C-Press with Index Table. I'd like to triple my production, too.

Name_____ Title_____

Address_____

Company_____

City_____ Zone____ State_____

H19

MMT-PE HPM

THE HYDRAULIC PRESS MANUFACTURING COMPANY

A Division of Koehring Company • Mount Gilead, Ohio, U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 97

CONTRACT SERVICES DIRECTORY

Listings, $12.00 per inch ($1.50 per 1/8 inch) Minimum charge, $4.50 per insertion. Rates net.

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19250 Plymouth Road, Detroit, Michigan, VErmont 5-6000. Tools and Dies, Special Machinery, Sheet Metal Stampings and Assemblies.

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Production Facilities for Metal Stampings, also Woodworking, Machining, Welding, Painting and Assembly. Tooling & Production at Reasonable Prices.
Large or Small Parts
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DESIGNERS AND BUILDERS
Jigs and Fixtures Special Machines
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Made to Specifications
LOW PRICES: WRITE
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THE INDUSTRIAL MACHINE CO.
1436 East 47th St., Cleveland, Ohio. Founded in 1908. Builders of Special Machinery. General Machine Work.

KIFFER TOOL & DIE CO.
5601 Tillman Avenue, Cleveland, Ohio, WOodbine 1-2440 & 1-2441. Manufacturers of Special Machinery, Tools, Dies, Jigs, Fixtures, Swiss Jig Boring.

NOBLE & STANTON, INC.
998 Broadway, Bedford, Ohio, BEdford 2-2800. Tooling, Short Run Production and Machined Parts for Automation.

Representatives Wanted

Manufacturer of high precision, heavy-duty high-speed pneumatic tools—straight or right-angle design—lightweight, cool-running, compact—extreme accuracy and easy operation in tight places—grinders, drills, sanders, blind rivet trimmer attachments—seeks men now selling abrasives, cutting tools, carbide burrs and production tools to stamping plants, foundries, tool and die makers, plastic and metal parts manufacturers. Profitable expanding line, excellent repeat business. Please state area now covering, manufacturers now representing, and size of your organization. Write to Tooling & Production Magazine, Dept. 4, 1975 Lee Road, P.O. Box 3505, Cleveland 18, Ohio.

FAST, CLEAN, ECONOMICAL HEAT

Provides high, fast heat for metal bending, metal forging, occasional heat treating, metal forming and preheating. Clean, efficient, equipped with four burners. Two end burners have separate shut-off valves, may be turned off for smaller jobs. Operates economically on any type of gas. Convenient gas-air adjustment panel. Adjustable swinging refractory lid. Adjustable front rack to support long pieces and hold tools. Solenoid safety valve turns gas off automatically when blowers are turned off. High temperature, insulated firebox, 5½" by 7½" by 27". Maximum 425,000 BTU input. F.O.B. Factory $246.00.

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if it burns gas look to Johnson
— Since 1901

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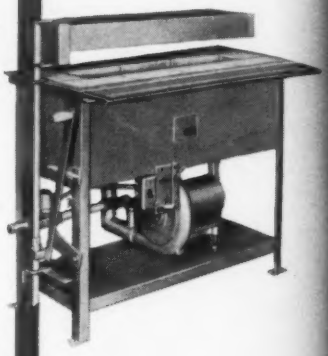
NO. 133 FORGE FURNACE



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Johnson Gas Appliance Company
575 E Avenue N.W.
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CIRCLE INFORM-A-GRAM KEY NO. 981

THE MARK OF AUTHORITY

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SOLID CARBIDE GAGES

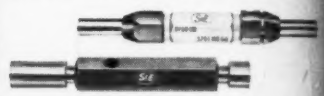
✓**dependable accuracy to start with...**

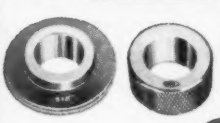
✓**repetitive accuracy to work with...**

S&E solid carbide gages will remain true to size longer—up to 50 times longer than steel gages. You'll **know** you are **correct to size** and continue to be . . . long after you have saved the cost, over and over again, of an S&E gage.

S&E gagemakers work with the finest gagemaking equipment and materials, under controlled atmospheric conditions — producing the optimum in gage accuracy and economy. Place an order now—you'll be glad you did.

Cylindrical Plug Gages
tri-lock—taper lock—progressive—reversible





Ring Gages

Master Setting Discs

S&E "Thrifty" Gage

tolerance classes: xx-x-y-z
special tolerances available

Complete catalog of S&E tools available on request.

S&E MACHINE PRODUCTS INC.
Bridgeport, Michigan
Offices in all principal cities.

CIRCLE INFORM-A-GRAM KEY NO. 982

FOR PRECISION DRILLING AT RAYTHEON

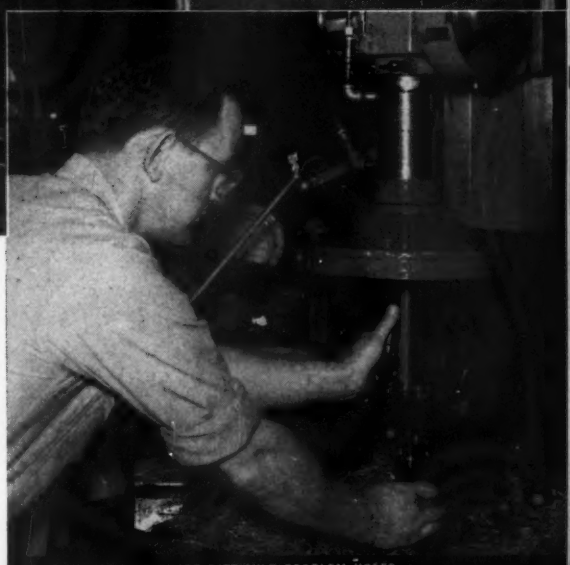
IT'S THE EDLUND MODEL 2G VERTICAL GUN DRILL

EON'S MISSILE SYSTEMS PLANT, ANDOVER, MASS. USES THE EDLUND MODEL 2G GUN DRILL FOR ATE EFFICIENT DRILLING IN HARD TO WORK METALS.

hen your company, like RAYTHEON'S Missile Systems Division Plant, ndover, Mass., requires drilling with extremely close tolerances and precise curacy, the EDLUND MODEL 2G VERTICAL GUN DRILL is the answer. his machine can cut cost and speed work with the elimination of secondary erations. The EDLUND MODEL 2G VERTICAL GUN DRILL offers precision illing of odd shaped parts. It is ideal for firms doing intricate work in air-aft, missiles, electronics, or other specialized fields.

he EDLUND MODEL 2G VERTICAL GUN DRILL Offers These Features:

1. The Most Economical Gun Drilling Machine on The Market
2. TRUE Holes with a FINE Finish—2 to 32 Micro Inches
3. Accurate Drilling of ALL Types of Material
4. This Machine Offers Features to Utilize The Full Potential of the Modern Rotating Carbide Gun Drill. ***Send for Free Illustrated Bulletin 2G***



EASY DRILLING OF THOSE DIFFICULT PROBLEM HOLES.
COMPLICATED PARTS EASILY DRILLED WITH EDLUND GUN DRILLING MACHINE
.125" Diameter Holes—5½" Deep. Size within .003" Straightness within .002"

LUND REPRESENTATIVES IN MAJOR CITIES

EDLUND

ACHINERY COMPANY, Cortland, New York

of Horace Corporation

MMT-PE — MODERN MACHINE TOOLS — PRODUCTION EFFICIENCY

CIRCLE INFORM-A-GRAM KEY NO. 99

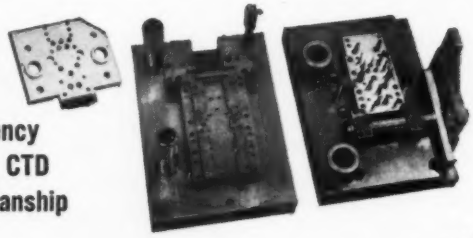
Cleveland Tool and Die
CASE FILE

Reliability and quality assured to .001"

CTD PRECISION SECTIONAL DIES ASSURE QUALITY OF TEXAS INSTRUMENTS TRANSISTORS

Check the transistors in the next portable radio you hear, and chances are they'll read "TI" — trade mark of Texas Instruments Incorporated of Dallas, Texas. This aggressive company supplies leading manufacturers of computers, missiles and electronic equipment. For contour ground dies of extremely critical tolerances, TI chooses CTD sectional dies to stamp the tab sheets for the ultra-small semi-conductor wafer assembly within the transistor header. "Reliability and quality assurance demand component parts used with TI's transistors be uniform to .001"," says Texas Instruments.

Another example of the important production efficiency made possible by CTD precision craftsmanship



Cleveland Tool and Die *means precision...*

Dies, Jigs, Fixtures and Special Purpose Tooling

Send for brochure describing CTD's plant and facilities. FREE!

Cleveland Tool and Die Co.
30510 Lakeland • Willowick, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 100

• Carbide Tipped Punches

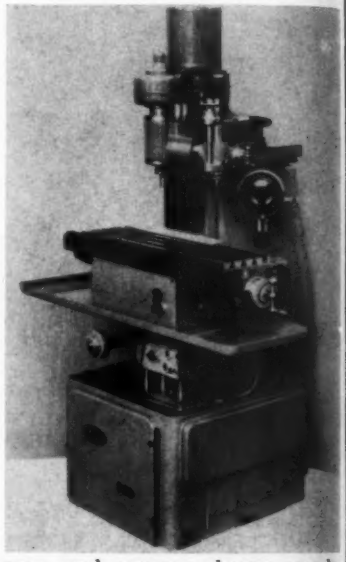
Porter Precision Products has bonded carbide tips to the end of tool steel punches, eliminating collapse after frequent impact. They'll introduce the punches at the show, at Booth 942, or Circle Inform-A-Gram No. F67.

• Production Grinder

On display at the Olivetti Corp. of America booth will be Model R4-300P/Y high precision cylindrical grinder, which can be preset to grind within 0.000050" to a positive stop. It has an 8-speed automatically - braked headstock and drives a 16" wheel with a 4-hp motor. Visit Booth 1660, or Circle Inform-A-Gram No. F68.

• Copy Milling Machine

The R20 copy-milling machine is for the production of metallic models, molds, and dies. Both con-

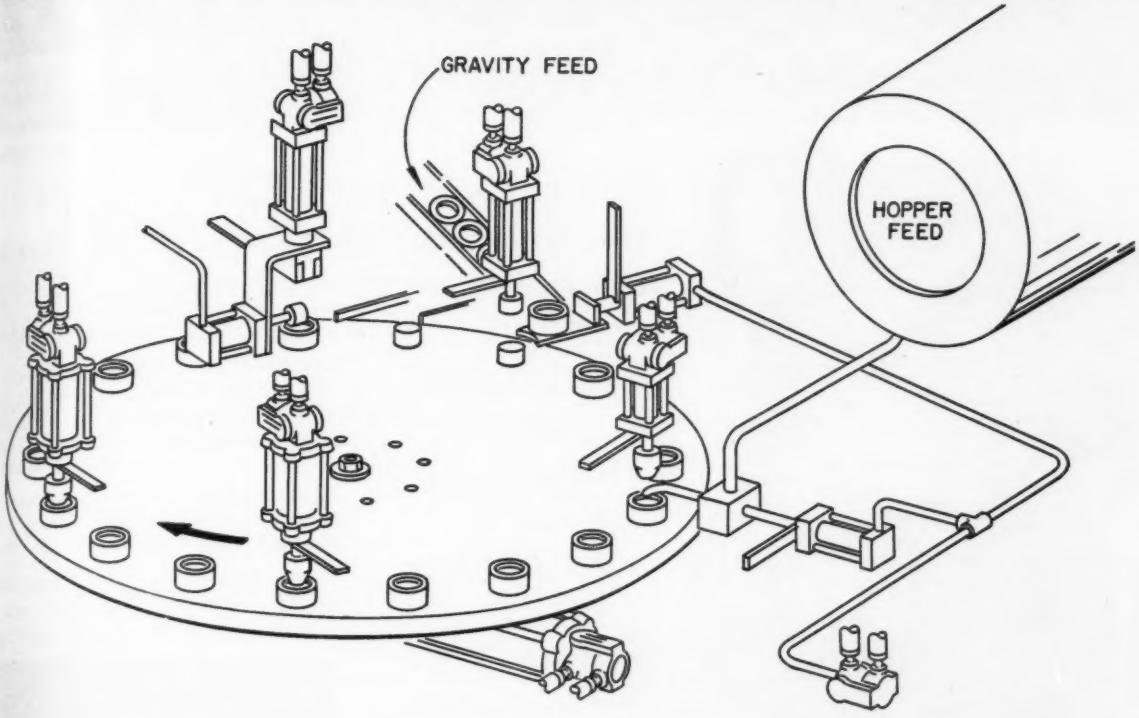


cave and convex shapes can be handled by the automatic machine. Copying accuracy is 0.0008". For details, see Alina Corp., Booth 1608, or Circle Inform-A-Gram No. F69.

• New Belt Sander

A new improved hand stroke belt sander will be shown by Boice-Crane Co. It's designed to give high finish to flat metals up to 36" x 60" x 4", or stock up to 12" wide in any length. Contours and irregular shapes can also be finished on the 10" dia drums. Booth 744 shows them, or Circle Inform-A-Gram No. F70.

THIS BELLOWS "SPOT-A-MATION IDEA" SAVED $82,754.00



Engineers at the Naval Ordnance Plant, Macon, Georgia, were given the assignment to "effect major production economies" in the assembling of explosive components for ordnance use. The operations were being performed manually by 33 people. The engineers designed and built two automatic assembly machines, each using a Bellows Rotary Index Table and five explosion-proof Bellows Air Motors. The savings on direct labor costs alone on one contract amounted to .0109 man-hours per assembled part for a total dollar savings of $82,754.00.

This same basic idea can be readily adapted to handle an almost unlimited range of small parts assembly procedure: staking, crimping, screw or stud placement, welding partial or complete small assemblies, etc.

It is typical of the many ways ingenious engineers "spot-automate" costly and troublesome production centers with Bellows "Controlled-Air-Power" Devices.

Chances are that many such opportunities exist in your plant. Why not investigate today?

Air Force Photo by Robins AF Base, Ga.

The savings of $82,754.00 made through these automatic assembly units are based on direct labor costs and are exclusive of any possible savings from reduced overhead. In addition, 1000 sq. ft. of floor space was released for other operations.

SEE THIS SPOT-A-MATION IDEA IN ACTION

BOOTH 1109 • ASTE SHOW

Be sure to see the basic Spot-A-Mation Idea shown above, together with other cost-cutting ideas, on display in the Bellows-Valvair booth at the Tool Show, Detroit, April 21-28.

14928-3

The Bellows Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

AKRON 9, OHIO

OTHER INDUSTRIAL DIVISIONS OF IBEC: Sinclair-Collins Valve Co., Valvair, Akron, Ohio • V. D. Anderson Co., Cleveland, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 101

Announcing the Van Keuren
THREAD RING COMPARATOR

It does the job
FASTER and EASIER
than rings
AT LESS COST

If you use THREAD RING GAGES in your production line, the new VAN KEUREN THREAD RING COMPARATOR will dispense with many gages and much labor cost — in providing quick, accurate and repetitive measurements.

The Van Keuren Thread Ring Comparator is a production gage for checking external threads up to ¾" diameter.

Gages both full form and pitch diameter • Sets and checks quickly

Gives uniform results. Repeats to .0002" • Long lasting — has no pivots

Write for descriptive literature or call your nearest Van Keuren representative for demonstration. Literature is available covering our full line of Thread Gages and other measuring equipment.

VK

THE Van Keuren CO.
Since 1920
182 Waltham Street, Watertown 72, Massachusetts
PRECISION MEASURING TOOLS
. . . rated the world's most accurate
Plug Gages · Measuring Wires · Optical Flats and Light Wave Equipment · Gage Blocks · Precision Lapping Service and Parts

CIRCLE INFORM-A-GRAM KEY NO. 102

• Gage Supplies

Soft blank top jaws and gage supplies will be on display at Huron Machine Products Inc.'s booth. Gage handles and gage blanks will also be shown. Visit Booth 936, get a catalog, or Circle Inform-A-Gram No. F71.

• Precise Rotary Table

More precise angular spacing and direct reading to 1 sec, with over-all performance accuracy of ±2 sec throughout the entire 360°, are features of Model 2 ultra-precise rotary table, to be displayed by Moore Special Tool Co. at Booth 1105. Its accurate in horizontal or vertical position. Circle Inform-A-Gram No. F72.

• Spot Tool Position

The Distometer, which provides the lathe operator with a fast, reliable, convenient means of spotting

tool position and directly measuring longitudinal cutting distances, will be shown by Federal Products Corp. It can increase lathe productivity 27%. Stop at Booth 1000, or Circle Inform-A-Gram No. F73.

• Durable Tool Holders

Positive drive is provided by the Tool-Flex tool holders that are extremely durable because they only have four main parts. The collet is mounted in a shock absorbing neoprene rubber that permits full-floating for both parallel and angular machine spindle misalignment. See Burgmaster Corp. at Booth 734, or Circle Inform-A-Gram No. 74.

CIRCLE INFORM-A-GRAM KEY NO. 103 ⟶

NOW

FOR THE FIRST TIME! REAL INTERCHANGEABILITY IN UNITIZED TOOLING

NEW UNIPUNCH "AJ" Series provides not only INTERCHANGEABILITY with UNIPUNCH Series "A"—but also with units and parts of other leading manufacturers!

In keeping with the UNIPUNCH Series "A" Hole Punching and Notching Units this new UNIPUNCH "AJ" Series has the popular "standard" 8⅜" shut height, 3½" die height and the same maximum capacity of ¼" thick mild steel permitting all these Units to be used in the same setups.

All-steel cast holders produce longer life by combining higher tensile strength and longer wear plus greater bearing surface for punch guides than previously available in this type of holder.

USING PEDESTAL DIES Pedestal Die design is ideal for punching holes in angles, extrusions, channels and formed parts with lips or flanges. Slug chutes in these Pedestal Dies may be directed to prevent piling up of slugs—an important feature in making setups for punching a cluster of round or shaped holes.

USING DIE ADAPTERS UNIPUNCH Type "AJ" Hole Punching Units with Die Adapters provide inexpensive Die Button replacement plus quick, easy interchangeability of standard low-cost die buttons—same as used in UNIPUNCH Type "A" and "B" Hole Punching Units.

WRITE FOR CATALOG "AJ" TODAY

UNIPUNCH®

10 TON AIR-HYDRAULIC PRESS

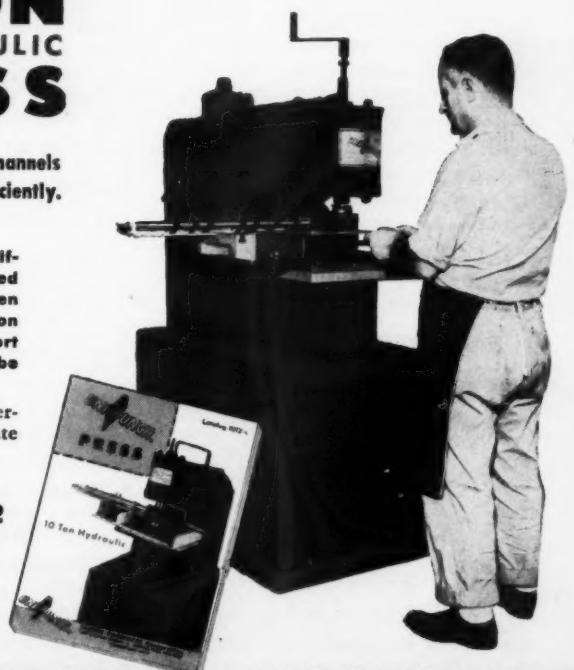
UNIPUNCH PRESS with UNIPUNCH TOOLING punches holes in sheets, angles, channels and extrusions plus notching operations...more economically and more efficiently.

Only UNIPUNCH PRESS has ALL these *features:*-

Exclusive (pat. applied for) hydraulic control provides self-adjusting, self-compensating power stroke with positive stop automatically determined by punch break through in metal, eliminating close ram adjustment when punching various thicknesses of material. Removable ram nose or cap on press ram permits use of detachable vee dies, marking heads and short stroke die sets for small bending and marking operations. Ram can be jogged by foot control.

Simplicity of design (air-hydraulic) • Minimum of moving parts • Operates at 10 tons from 75 pound air line pressure • 100 strokes per minute • 1⅞" ram daylight adjustment • Foot operated control • No double stroking • 15½" throat depth without gauging • Gauging from center of ram to left 24" and front to back 12" (punches to center of 24" sheet) • Gauging equipped with 7 adjustable stops — Optional gauging over 24" available.

WRITE FOR CATALOG 1012 TODAY



UNIPUNCH®

PUNCH PRODUCTS Corporation

374 BABCOCK ST., BUFFALO 6, NEW YORK

Who's Responsible for Today's High Machine Tool Costs and Obsolescence?

By **C. A. WALLACE**
Manager
Filtration Division
U. S. Hoffman Machinery Corp.

A Hoffman Vac-80 Vacu-Matic Filter is shown installed on a Norton 30" diameter stepped-wheel grinder for grinding transmission shafts at the Syracuse plant of a large automotive manufacturer.

Under present competitive conditions, production and sales crises develop swiftly. That's why many manufacturers employing machine tools are taking steps to combat the twin problems of high costs and obsolescence.

Dirty Coolants Blamed

Grinding and finishing machines originally tested for performance with clean coolants can not function near rated capacity when the coolant contains metal chips, solid abrasives, grit, dirt and fine particles. Contaminated coolant is responsible for numerous hidden expenses including shorter tool and wheel life, frequent down time for wheel dressing, tool sharpening and sump tank cleaning. Dirty coolant also means higher labor and material costs, shorter useful life of oils and coolants, poorer product finish, excessive maintenance costs, poor working conditions and more rejects. Leading tool design engineers have proven that the metalworking industry stands to gain millions of dollars annually through the use of efficient filtration equipment

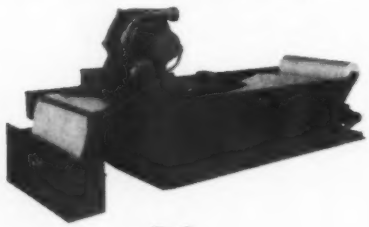


Fig. 1

such as the Vacu-Matic Filter developed by the U. S. Hoffman Machinery Corp. (Fig. 1.)

New Vacu-Matic Filters Increase Production and Cut Costs

Employing a new vacuum method, the revolutionary Hoffman Vacu-Matic Filter provides unusually high flow rates in continuous filtration of machine tool water soluble oil coolants. It is compactly designed to be used in place of the machine tool sump tank. Filter medium is a special, easily replenished paper on which solid particles are deposited. Coolant is drawn through the filtering paper by negative pressure with the dry sludge remaining on top of the paper. When sludge reaches a pre-set thickness, the filter paper is automatically indexed by a pressure differential switch and new paper moved over the vacuum area. Water-free sludge and filter paper drop off into the removable tote box for easy disposal.

Vacu-Matic Benefits and Advantages

- Removes all chips, abrasives, dirt and other solid contaminants with an overall efficiency of 98%
- Greatly reduces down time
- Protects against loading of grinding wheels
- Makes possible higher speeds, faster feeds, improved finishes, a better part at less cost
- Produces a four times greater cake than obtainable by conventional gravity flow through the paper
- Provides a 75% savings in filter paper costs
- Delivers dry sludge without coolant carry-over
- Minimizes coolant loss
- Maintains coolant at room temperature
- Effectively curtails bacteria growth
- Automatic and self-cleaning

The Hoffman Vacu-Matic is available in two models, Vac 40A and Vac 80. Vac 40A has a maximum flow rate of 40 g. p. m. for water-soluble oil coolants with a unit capacity of 50 gallons. The Vac 80 handles a maximum flow rate of 80 g. p. m. and has a unit capacity of 130 gallons.

Summing Up

With proper filtration equipment for delivering clean coolant to the work, it is possible to obtain as much as a 25% to 30% savings in cutting tools, grinding wheels, honing stones, broaches and other individual machine tools. Reduced down time and maintenance, extended useful life of coolants and lubricants, better finishes with fewer rejects, longer runs, sustained tolerances and other benefits, help amortize the costs of filtration equipment in a short time.

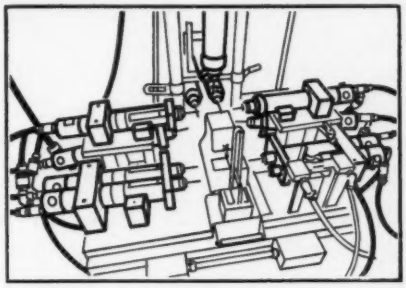
If you have a special filtering problem, Hoffman Filtration engineers are at your service to provide a free survey. Without cost or obligation, they'll give you objective recommendations on equipment specifically suited to your needs based on long experience in the improvement of manufacturing technology. To check on the unlimited industrial applications of the Hoffman Vacu-Matic and how it will pay for itself in your plant, send for free Bulletin FB 103, U. S. Hoffman Machinery Corp., Industrial Filtration Division, Thompson Road Plant #1, Syracuse, New York. Dept. P-1.

CIRCLE INFORM-A-GRAM KEY NO. 104

ARO IS YOUR ANSWER— LOW COST *Automation!*

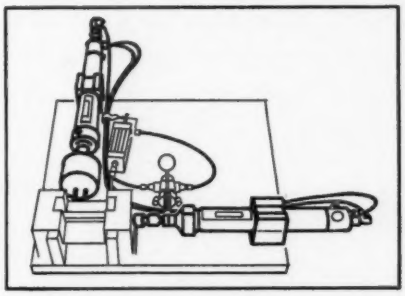
DRILL 3,000 per hour

Set up any number of Aro Self-Feed Drills in single fixture, then drill up to 3,000 holes per hour automatically. Capacities from $\frac{1}{16}$" to $\frac{1}{2}$" . . . speeds from 500 to 20,000 rpm . . . stroke lengths from $\frac{3}{8}$" to 6". Use any combination of types and speeds, mount drills in any position.



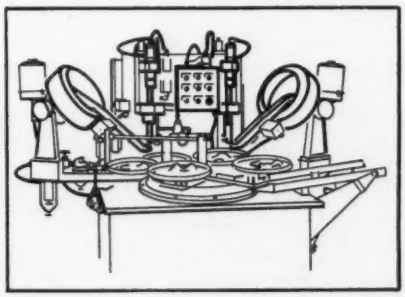
TAP 2,400 per hour

Combine your drilling and tapping operations in one fixture and eliminate costly handling. Aro Self-Feed Tappers have capacities up to ¼"-20 in mild steel, or larger holes in softer materials. Speeds of 500, 900, 1,450 and 2,700 rpm. Stroke lengths up to 1½". Accessories for precision depth.



FASTEN 3,000 per hour

Go automatic on your threaded-fastener operations with Aro Self-Feed Screwdrivers-Nutsetters. Standard range of speeds for the most commonly specified screw sizes. Uniform torque settings held within close limits. All models available with precision ball-type clutch.



Left hopper feeds pieces for drilling and tapping. Right hopper feeds screws for finished assembly. All Aro tools are standard production models.

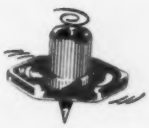
see ARO self-feed air tools *IN ACTION*— drill, tap, fasten!

BOOTH No. 1918

A. S. T. E. SHOW

FINISHED SAMPLE IS YOURS!

This top is machined and assembled automatically on fixture at left. It's yours to keep . . . and it's a reminder that *if it's ARO it's tops!*



ARO®

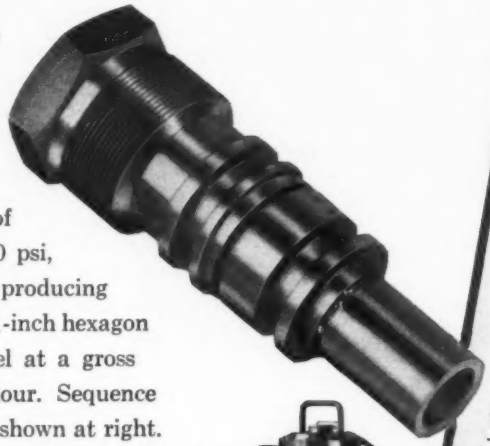
THE ARO EQUIPMENT CORPORATION, Bryan, Ohio

Aro of California, 3141 S. Grand Ave., Los Angeles 7, Calif.
Aro Equipment of Canada Ltd., Rexdale (Toronto), Ontario
Offices in All Principal Cities

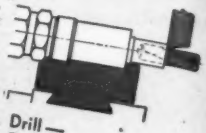
CIRCLE INFORM-A-GRAM KEY NO. 105

GREENLEE AUTOMATICS SPEED PRODUCTION of precision pump part...

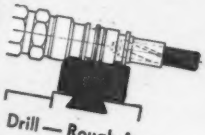
The part is the injector cylinder of the Greenlee No. 798 High-Pressure Portable Power Pump manufactured by Greenlee Tool Co., a division of Greenlee Bros. & Co. Since the pump is capable of developing pressures up to 10,000 psi, extreme precision is required in producing the cylinder. It is machined from 1-inch hexagon 4150 chromium-molybdenum steel at a gross production rate of 48 pieces per hour. Sequence of the 13 operations performed is shown at right. Your Greenlee representative will be glad to help solve your precision part problems . . . just send us a print.



1. Roller turn — Spot drill — Rough form

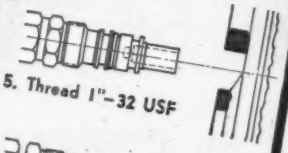


2. Drill — Face — Rough form

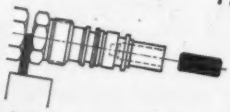


3. Drill — Rough form

4. Bottom drill — Finish form



5. Thread 1"–32 USF



6. Ream — Cut off

PRODUCTION MACHINERY

GREENLEE

Transfer Machines • Special Machines • Automatic Bar Machines
Die Casting Machines and Trim Presses • Woodworking Machines
Tools for Woodworking • Hydraulic Tools for Craftsmen

GREENLEE BROS. & CO.

1879 MASON AVE.
ROCKFORD,
ILLINOIS

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3	19	34	87	105	139	981	1225	1321	1371	1453	1521	1581	1642
4	20	42	89	106	140	982	1226	1322	1372	1471	1522	1582	1643
5	21	43	90	107	143	1121	1227	1323	1373	1472	1523	1591	1644
6	22	44	91	108	144	1122	1251	1324	1381	1473	1524	1592	
7	23	45	92	109	146	1123	1252	1331	1382	1474	1551	1593	
8	24	46	93	110	150	1171	1253	1332	1383	1481	1552	1594	
9	25	47	94	111	153	1172	1281	1333	1411	1482	1553	1601	
11	26	48	96	113	154	1191	1282	1334	1412	1483	1554	1602	
12	27	50	97	114	157	1192	1291	1335	1413	1491	1561	1611	
13	28	77	99	115	163	1193	1301	1341	1414	1492	1562	1612	
14	29	79	100	116	165	1194	1302	1342	1421	1511	1563	1613	
15	30	81	101	118	166	1221	1311	1343	1422	1512	1564	1621	
16	31	83	102	121	951	1222	1312	1344	1423	1513	1565	1622	
17	32	85	103	124	952	1223	1313	1351	1451	1514	1566	1623	

EDITORIAL ITEMS

C1	C16	C31	D12	F1	F16	F31	F46	F61	G2	P7	P22	P37
C2	C17	C32	D13	F2	F17	F32	F47	F62	G3	P8	P23	P38
C3	C18	C33	D14	F3	F18	F33	F48	F63	G4	P9	P24	P39
C4	C19	C34	D15	F4	F19	F34	F49	F64	G5	P10	P25	P40
C5	C20	D1	D16	F5	F20	F35	F50	F65	G6	P11	P26	H1
C6	C21	D2	D17	F6	F21	F36	F51	F66	G7	P12	P27	H2
C7	C22	D3	D18	F7	F22	F37	F52	F67	G8	P13	P28	H3
C8	C23	D4	D19	F8	F23	F38	F53	F68	G9	P14	P29	
C9	C24	D5	D20	F9	F24	F39	F54	F69	G10	P15	P30	
C10	C25	D6	D21	F10	F25	F40	F55	F70	P1	P16	P31	
C11	C26	D7	D22	F11	F26	F41	F56	F71	P2	P17	P32	
C12	C27	D8	D23	F12	F27	F42	F57	F72	P3	P18	P33	
C13	C28	D9	D24	F13	F28	F43	F58	F73	P4	P19	P34	
C14	C29	D10	D25	F14	F29	F44	F59	F74	P5	P20	P35	
C15	C30	D11	D26	F15	F30	F45	F60	G1	P6	P21	P36	

Which article in this issue was of most interest to you? _____

THESE INFORM-A-GRAM CARDS are for the convenience of TOOLING & PRODUCTION readers who, we know, rarely have stenographic help at their beck-and-call while reading. To get further information concerning selected items featured —all one needs is an INFORM-A-GRAM card and a pencil or pen to circle the number of the items wanted. If there is no identifying number, use the page number.

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C8	C23	D4	D19	F8	F23	F38	F53	F68	G9	P14	P29	
C9	C24	D5	D20	F9	F24	F39	F54	F69	G10	P15	P30	
C10	C25	D6	D21	F10	F25	F40	F55	F70	P1	P16	P31	
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C14	C29	D10	D25	F14	F29	F44	F59	F74	P5	P20	P35	
C15	C30	D11	D26	F15	F30	F45	F60	G1	P6	P21	P36	

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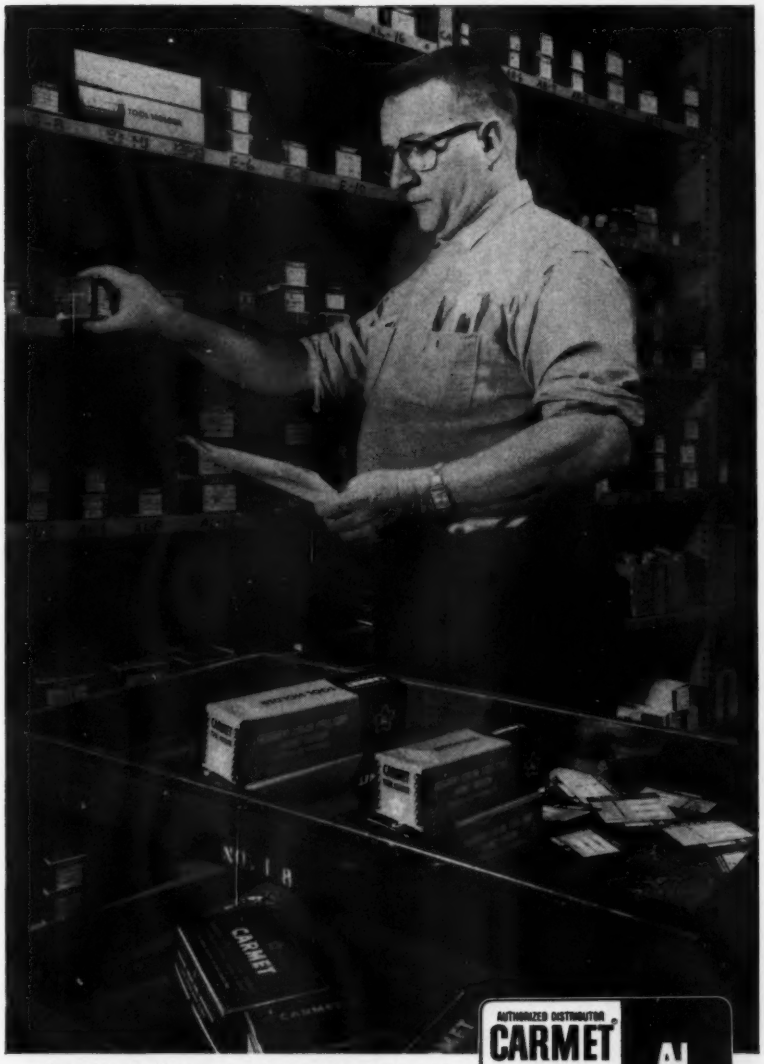
Off-the-shelf delivery of Carmet® Carbide Tools from your local CARMET Distributor



Over 75 distributors, coast to coast, display this sign—service in your own local area.

Keep your inventory of Carmet Carbide Tools at a comfortable level. Keep your working capital free for other needs. Your Carmet distributor carries the load—that's how he's set up to do business.

He carries your needs from the complete line of Carmet Carbide Tools in all grades and every style. He is geared to deliver your orders quickly—a phone call gets action.

And if you get in a production jam, special service is his middle name. Remember, your Carmet distributor knows carbide tooling—with the help of the local Carmet technical man, you get all the help you need.

Your Carmet distributor handles the best Carbide Tools and backs it with the best service! ***Allegheny Ludlum Steel Corporation, Carmet Division, Ferndale, Detroit 20, Michigan.***

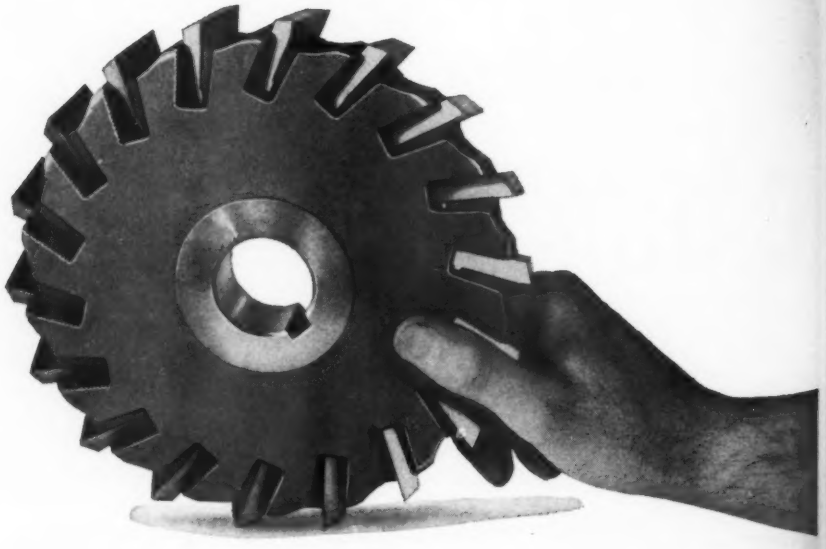
CARMET® AL

CEMENTED CARBIDE • DIVISION OF ALLEGHENY LUDLUM

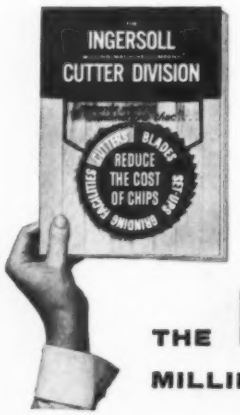
1300

CIRCLE INFORM-A-GRAM KEY NO. 107

Which cutter will produce fewer rejects?



LOOK TO INGERSOLL FOR THE ANSWER



You haven't a chance to choose . . . both pictures show the same cutter! You see, there are many factors, other than cutter design, that can affect machining adversely and turn a piece into a reject.

But you do have the chance to prevent trouble by analyzing all factors involved, in advance. Firms that rely on Ingersoll to assist in setting up procedures find the economical answers that hold costly rejects to a minimum or eliminate them entirely.

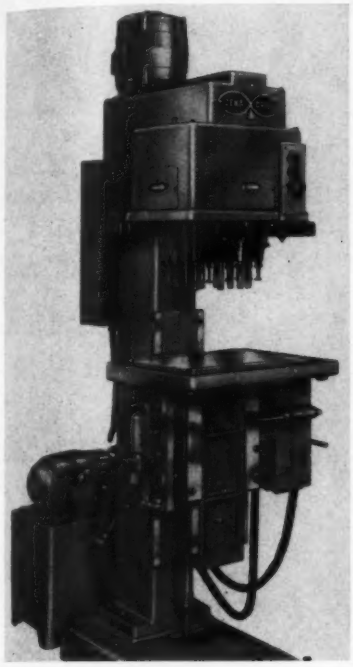
Let an Ingersoll representative help you with a preliminary survey of your metal removal practices. It will cost you nothing . . . could lead to important savings. Ask a representative to call, or write for the booklet, "Ways to Reduce the Cost of Chips." Address Dept. H-68.

THE **INGERSOLL**
MILLING MACHINE COMPANY **CUTTER DIVISION** ROCKFORD, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 108

• Drill-Tap Machine

This low-cost multiple-spindle drilling and tapping machine will be on display at the Precision Tool Mfg. Co. booth. The two standard

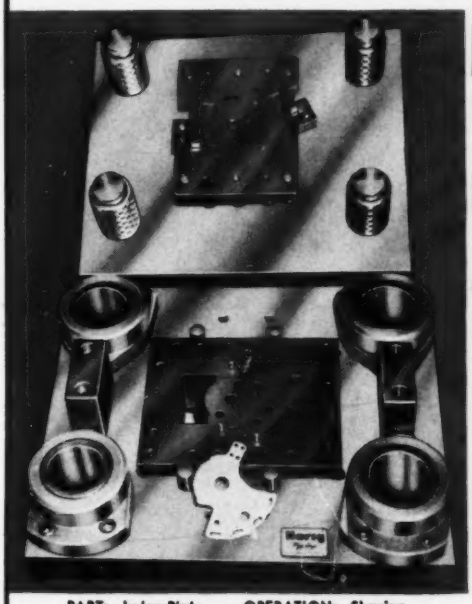


Deka-Drill models are capable of drilling and tapping up to and including a total of 12 holes. See them at Booth 1539, or Circle Inform-A-Gram No. G1.

• Adaptable Jig Grinder

Grind holes ½″ to 4″ dia with this attachment. Two series from Vulcan Tool Co. can be used on

surface grinders, lathes, boring mills, jig borers, and drill jigs. See it at Booth 1254, or Circle Inform-A-Gram No. G2.



ARE YOU OVERLOOKING A HARIG CARBIDE DIE APPLICATION?

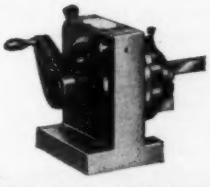
PART: Index Plate OPERATION: Shaving
MATERIAL: .063 C.R.S.

HARIG CARBIDE DIES ARE THE LOGICAL ANSWER TO LOW COST, HIGH PRODUCTION RUNS

Leading manufacturers are turning to Harig Carbide Dies for forming, drawing, shaving and notching in addition to blanking and piercing applications . . . because they consistently outproduce steel dies 10-15 to 1 (fewer grinds mean reduced maintenance and set-up costs), yet cost only ½ more than steel dies. On long stamping runs, one Harig Carbide Die can take the place of several steel dies—at a great savings to you. We would be pleased to consult with you on your next tooling program and suggest either Harig Carbide or Steel Dies to fit your needs.

HARIG GRINDING TOOLS

HARIG TML 6 x 12 SURFACE GRINDER. The tool and die makers precision grinder.

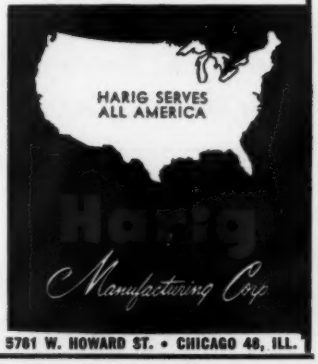


GRIND-ALL FIXTURE. The latest advancement in perforator grinding.

WHATEVER YOUR TOOLING REQUIREMENTS ... HARIG IS READY TO SERVE YOU!

ENGINEERING	PROGRESSIVE DIES
DESIGNING	MOLDING DIES
CARBIDE DIES	JIGS, FIXTURES & GAGES
LAMINATION DIES	SPECIAL MACHINING

WRITE FOR FREE CATALOG



5701 W. HOWARD ST. • CHICAGO 48, ILL.

"VISIT OUR BOOTH 1045 AT THE A.S.T.E. TOOL SHOW"
CIRCLE INFORM-A-GRAM KEY NO. 109

SAVE THIS AD FOR CHECKING FUTURE REQUIREMENTS

WHY WAIT?

DELIVERY FROM STOCK

SPECIAL RH & LH
HIGH SPEED

TAPS • DIES • THREAD PLUG & RING GAGES

NEW SIZES ADDED DAILY . . . IF NOT LISTED— WRITE

DEALER INQUIRIES INVITED

SIZE	THREADS PER INCH
0000	160
000	120
00	90-96-112
0	56-64-72-76-80-90
1	48-56-60-64-80-90
2	48-52-54-56-60-72-80-96
3	36-40-60-64-72-80
4	30-32-38-42-44-56-60-64-72-80-90
5	22-27-30-32-36-38-42-48-50-56-60-64-72-80
6	24-28-30-36-38-42-44-48-56-60-64-72-80
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8	24-26-28-30-38-40-44-48-56-60-64-72-80
9	24-28-30-32-36-40
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24	14-16-18-22-24
26	14-16-20-24
28	14-16-20
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1/16	56-60-64-72
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3/32	32-36-38-48-50-56-60-64
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7/64	36-40-42-44-48-50-56
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9/64	30-32-38-40
.148	38
5/32	24-26-28-30-32-36-38-40-50
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.300	28
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23/32	11-12-16-18-20-24-27-32-36-40
47/64	10-12-16-18-20
3/4	8-9-11-12-14-15-18-20-22-24-26-27-28-30-32-36-40-48
49/64	10-16-18-20
25/32	10-12-16-18-20-24-27-32-40
.800	16
13/16	8-10-12-14-16-18-20-24-27-28-32-40
.835	16
55/64	6-12
27/32	9-10-18-20-24-27-32-40-48
.850	14
7/8	8-10-11-12-13-16-18-20-24-26-27-28-30-32-36-40
29/32	9-12-14-18-20-24-27-28-32
15/16	8-9-10-12-14-16-18-20-24-26-27-28-32-40
31/32	8-9-12-16-18-20-24-28-32
1	5-7-9-10-11-12-16-18-20-24-26-27-28-30-32-36-40-48
1-1/32	8-12-14-16-18-20
1-3/64	12-14-16-18-20
1-1/16	7-8-10-12-14-16-17-18-20-24-27-28-32-40
1-3/32	7-8-9-12-14-16-18-20-32
1-1/8	8-10-14-16-18-20-24-27-28-32-40-48
1-5/32	7-8-9-12-14-16-18-20-24-32
1-11/64	18
1-3/16	7-8-10-12-14-16-18-20-24-27-28-32-40
1-1/4	8-10-14-16-18-20-24-27-28-32-40
1-5/16	6-7-8-10-12-14-16-18-20-24-27-28-32-40-48
1-3/8	5-8-10-14-16-18-20-24-27-32-40
1-13/32	12-16-18-20
1-7/16	6-8-10-12-14-16-18-20-24-27-28-32-40
1-1/2	7-8-9-10-13-14-16-18-20-24-27-28-32-40
1-17/32	7-12-16-18-20
1-9/16	6-8-10-12-14-16-18-20-24-32-40
1-5/8	5-5½-6-8-10-11½-12-13-14-16-18-20-24-28-32-40
1-11/16	8-10-12-14-16-18-20-24-32
1-23/32	5-8-12-16-18-20
1-3/4	5-6-8-10-12-13-14-16-18-20-24-28-32-40
1.767	18
1.7715	12
1-13/16	8-10-12-14-16-18-20-24-32
1-7/8	5-8-10-12-14-16-18-20-24-32
1-29/32	12-16-18-20-32
1-15/16	8-10-12-14-16-18-20-24-32
2	4½-6-8-10-12-14-16-18-20-24-28-32
2-1/16	8-10-12-14-16-18-20-24-32
2-1/8	4½-8-10-12-14-16-18-20
2-3/16	8-10-12-14-16-18-20-24
2-1/4	4½-8-10-12-14-16-18-20-24
2-5/16	8-10-12-14-16-18-20-24
2-3/8	4-8-10-12-14-16-18-20-32
2-7/16	8-10-12-14-16-18-20
2-1/2	4-6-8-10-12-14-16-18-20
2-9/16	8-10-12-14-16-18-20
2-5/8	4-8-10-12-14-16-20-32
2-11/16	8-10-12-14-16-18-20-32
2-3/4	4-8-10-12-14-16-18-20-32
2-7/8	4-8-10-12-14-16-18-20-24-32
2-15/16	8-10-12-14-16-18-20-32
3	3½-4-8-10-12-14-16-18-20
3-1/16	20
3-1/8	4-8-10-12-14-16-20
3-3/16	4-8-10-12-14-16-20
3-1/4	4-8-10-11-12-14-16-18-20
3-3/8	4-8-10-12-16
3-1/2	4-8-10-12-16
3-5/8	4-8-10-12-16
3-3/4	4-8-10-12-16
3-7/8	4-8-10-12-16
4	4-6-8-10-12-16
4-1/8	4-8-10-12-16
4-1/4	4-8-10-12-16

Many more sizes in stock up to 6" dia.

LEFT HAND N.C. (USS)—N.F. (SAE) SIZES

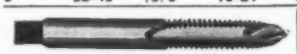
SEE ABOVE SECTION FOR MORE SIZES

SIZE	THREADS	SIZE	THREADS	SIZE	THREADS	SIZE	THREADS
0	80	8	32-36	7/16	14-20	1"	8-12-14
1	64-72	10	24-32	1/2	13-20	1-1/8	7-12
2	56-64	12	24-28	9/16	12-18	1-1/4	7-12
3	48-56	14	20-24	5/8	11-18	1-5/16	6-12
4	36-40-48	1/4	20-28	11/16	11-16	1-3/8	6-12
5	40-44	5/16	18-24	3/4	10-16	1-7/16	6-12
6	32-40	3/8	16-24	7/8	9-14	1-1/2	6-12

'OVERSIZE' and 'UNDERSIZE' TAPS

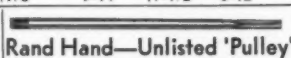
RIGHT AND LEFT HAND N.C. AND N.F. SIZES

MACHINE SCREW	#2 to #5	Plus or Minus	.002, .003, .005
MACHINE SCREW	#6 to #14	Plus or Minus	.003, .005, .010
FRACTIONAL	1/4" to 1-1/2"	Plus or Minus	.003, .005, .010, .015, 1/64, 1/32



Right & Left Hand—Unlisted 'Gun' or Spiral Pointed Taps

Size	Threads	Size	Threads
0	80 NF		
1	56 NS	7/8	9 NC, 14 NF
2	56 NC, 64 NF	1	8 NC, 12-14 NF
9/16	12 NC, 18 NF	1-1/8	7 NC, 12 NF
5/8	11 NC, 18 NF	1-1/4	7 NC, 12 NF
11/16	11 NS, 16 NS	1-3/8	6 NC, 12 NF
3/4	10 NC, 16 NF	1-1/2	6 NC, 12 NF



Rand Hand—Unlisted 'Pulley' And Extra Length Taps

Size	Threads	Size	Threads
4	36-40 NC, 48 NF	3/8	24-NF
5	40 NC, 44 NF	7/16	20 NF
6	32 NC, 40 NF	1/2	20 NF
8	32 NC, 36 NF	9/16	12 NC
10	24 NC, 32 NF	9/16	18 NF
12	24 NC, 28 NF	5/8	18 NF
1/4	28 NF	3/4	16 NF
5/16	24-NF	Also Larger Sizes	NC & NF

UNLISTED Right Hand "Pipe" Taps

Taper "NPT" Size	Taper "NPT" Thread	"NPS" Size	"NPS" Thread	EX. LENGTHS "NPT" & "NPS" Size	EX. LENGTHS "NPT" & "NPS" Thread
1/16	27	1/16	27		
1/4	27	1	8	1/16	27
2-1/2	8	1-1/4	11½	1/8	27
3	8	1-1/2	11½	1/4	18
3-1/2	8	2	11½	3/8	18
4	8	2-1/2	8	1/2	14
Also British		3	8	3/4	14
		3-1/2	8	1	11½
		4	8		
		Also British			

Lefthand 'Pipe Taps' Taper and Straight

Size	Thread	Size	Thread
1/16	27	1	11½
1/8	27	1-1/4	11½
1/4	18	1-1/2	11½
3/8	18	2	11½
1/2	14	2-1/2	8
3/4	14	3	8
Also British		3-1/2	8
		Also British	

The Largest Stock of

Special and Standard Taps, Dies, Plug Gages

SPECIAL RING GAGES

IF NOT IN STOCK

2 WEEKS DELIVERY

ACME TAPS IN STOCK

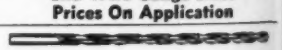
IF NOT IN STOCK—7 to 10 DAYS DELIVERY—When ordering or requesting quotations, kindly furnish following information:

(a) Kind of material being machined.
(b) Depth of hole in inches, through or bottom.
(c) Tap to be used horizontally or vertically.
(d) Will tap turn, or is piece expected to be turned.
(e) Is tapping job expected to be done in one pass.
(f) Would tap be backed out of hole, or machined stopped for release of tap.
(g) If possible, submit thread length, and overall length of tap desired with blue print.

SPECIAL REAMERS

Immediate Delivery

H.S.S.S. Machine Reamers Decimal, Fractional, Letter, and Wire Gauge Sizes Prices On Application



SPECIAL—Right Hand High Speed "EXTRA LENGTH DRILLS" "AND LEFT HAND DRILLS" In Stock for Immediate Delivery

DELIVERY! QUALITY! PRICE!

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CIRCLE INFORM-A-GRAM KEY NO. 110

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Industrial Cutting Tools

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See why ...they all prefer PRODUCTO die sets at Booth 1144 A.S.T.E. Tool Show 5 new products!

DIE DESIGNERS appreciate the *unlimited selection* of die sets which accommodate any type of die design.

DIE MAKERS like the amazing speed and ease of "take-apart and put-together" made possible by Qwik-Fit Guide Pins. (Safer handling, too.)

PRESSROOM FOREMEN are convinced that Producto die sets maintain accuracy through long runs, *keep production up, downtime down.*

CONTRACT SHOP OWNERS have found consistent die set accuracy, dependable delivery, and smooth performance justifies the confidence with which they specify Producto.

Quick, jam-free assembly and disassembly, lasting accuracy, unlimited selection of sizes and styles! Add to these advantages the benefits of immediate service in every industrial center through Producto's growing network of 46 branch assembly plants and distributor warehouses...and you realize why "They all prefer Producto". • **A WEALTH OF DIE SET INFORMATION** is available to you, free, in the comprehensive, easy-to-use Producto Catalog No. 11, and in regular issues of *Die Set Digest.* Write today for these valuable aids.

THE PRODUCTO MACHINE COMPANY
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PRODUCTO

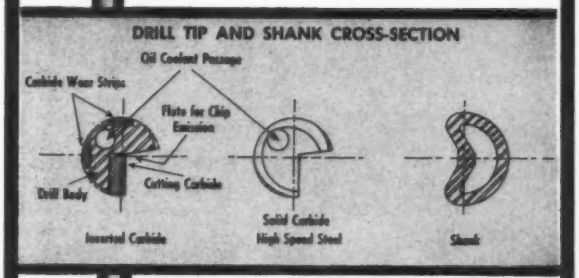
PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS

CIRCLE INFORM-A-GRAM KEY NO. 111

THIS DRILL ELIMINATES SECONDARY OPERATIONS

Just *one* pass with these high-speed steel or carbide-tipped gun drills produces an accurate, truly round, straight hole honed to mirror-bright finish. That's why you can drill small parts of all kinds — *faster, more accurately* and at *lower cost* with HI-STANDARD Gun Drills*.

Production parts that once had to be drilled individually can now be gang-nested and drilled through, producing holes identical in size, location and finish. Drilling of this kind is done on automatic indexing machines, lathes, horizontal and upright drilling machines, and similar equipment. Forced oil feed through the drill clears chips and cools cutting edge for faster drilling. No matter what the size or shape of your workpiece, drilling with HI-STANDARD Gun Drills is an



outstanding time-and-money saver. Any material that can be *machined*, can be *gun-drilled*.

Gun drilling is one important way in which forward-thinking manufacturers are increasing production and cutting costs. To find out how your company can do the same, write for your Hi-Standard Engineering File 20 *today!*

*Also called "deep-hole drills"

Pioneers in the Design and Development of Gun Drills for more than 30 Years

THE **HIGH STANDARD**
MANUFACTURING CORP.
HAMDEN • CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 1121

DO U BEND U BENDS?

Whether you bend "U" bends or other type bends from pipe, tubing, bus bar or structural metal, you'll bend it better, faster, more economically with Pedrick Production Benders.

PEDRICK TOOL AND MACHINE CO.
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"Why don't you send for the NEW PEDRICK LINE BULLETIN. Do it now."

BEND WITH PEDRICK

CIRCLE INFORM-A-GRAM KEY NO. 1122

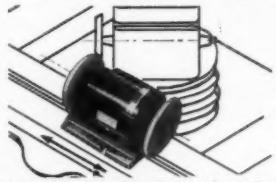
Announcing **NIAGARA CUTTER**

Motorized

DRESSER

to Cut Replacement Cost of

DIAMOND WHEELS



Quickly pay for themselves by dressing wheels with minimum removal of costly diamond surface. Motorized to eliminate friction drive and hogging. "Kiss" touch and control. Held to surface, cylindrical or cutter grinder with clamp or magnet. Complete data in Spec Sheet DW-160. Low price, order yours now.

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Div. of BOLLIER-DAMERELL, INC., 338 Niagara St., N. Tonawanda, N.Y. Manufacturers of Milling and Angle Cutters, Carbide and HSS Saws, Slitters, Face Mills and Special Tools.

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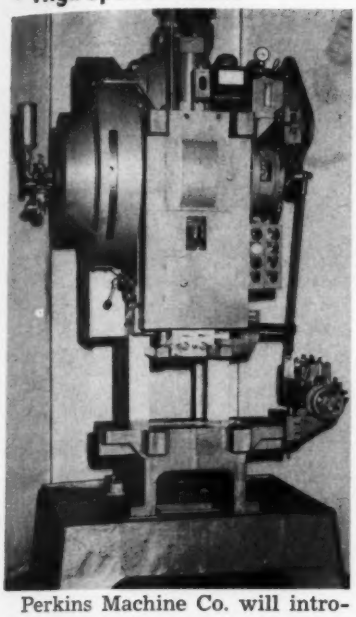
Handbook Of Layout and Dimensioning For Production	$15.00 ea.
Instruments For Measurement And Control	$10.00 ea.
Principles & Methods Of Sheet Metal Fabricating	$11.00 ea.
Protective Coatings For Metals	$12.50 ea.

For other books, information on ordering and our 10 days Trial Offer please refer to the Huebner Publications ad on pages 117-126-127.

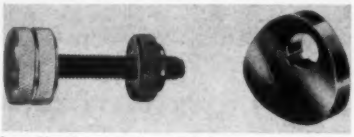
• High Speed Presses



Perkins Machine Co. will introduce 15-,22-, and 37-ton high speed presses at the Show. The 15- and 22-ton models feature 200-600 strokes/min speeds; the 37-ton model, 150-450 strokes/min. All models use air clutch and brake and automatic feeds. Adjustable strokes are possible with all models. See them at Booth 1438, or Circle Inform-A-Gram No. G3.

• Jig and Fixture Components

Some of their more than 1000 different jig and fixture components and clamp assemblies, in regular steel and stainless steel, will



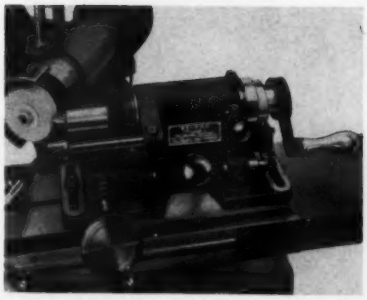
be displayed by Universal Engineering Co. Booth 614 will also show standard drill bushings, standard collet chucks, and floating chucks. See them, or Circle Inform-A-Gram No. G4.

• Finishing Broaches

Full-Form finishing broaches will be featured by National Broach & Machine Co. They're for producing precision internal spur and helical gears and splines in a single one-pass operation. With them, separate roughing and finishing operations are unnecessary. Stop at Booth 814, or Circle Inform-A-Gram No. G5.

• Versatile Fixture

The Weldon Tool Co. will feature its Model S relieving fixture at the Show. Designed primarily to produce S points on twist drills, it can also sharpen taps, countersinks and deburring tools, and relieve angles on step drills. Capacity is from 3/32″ through 3/4″ dia. It'll be at



Booth 439, or Circle Inform-A-Gram No. G6.

IF IT'S
DURABLE
IT'S
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Durable Punch & Die Company is your one best source of information regarding metal and plastic piercing applications. Durable's engineering knowhow helps solve perforating problems. Durable's perforators punch straight holes to reamer accuracy; hold close tolerances; perforates at angles; pierces round stock. They too have proven their value in cold piercing straight, burr free holes in Phenolic laminated plastics. Durable perforators give longer punch life because they are completely supported, vertically lapped and chrome plated to retard firing and galling, and to provide for easier stripping.
Write for Durable Engineer's Handbook. 121 pages, 100 illustrations. No obligation.
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CIRCLE INFORM-A-GRAM KEY NO. 113

MMT-PE

TO HELP YOU GRIND MORE FOR LESS

Up to 300% faster form grinding in carbide, ceramics- Brown & Sharpe MICROMASTER with VISUAL GRIND

VISUAL GRIND, the built-in comparator on the B&S 618 Surface Grinding Machine, permits tool and die makers to meet today's demand for intricate shapes in super-hard materials with spectacular savings in work hours and wheel costs.

Skilled operators can save up to 300% in set-up and grinding time. There is no need to remove work for frequent inspection with separate equipment. Semi-skilled workers, also, quickly learn to "follow the line," and match the clearly visible, true image of the work to the form layout drawn on the screen. Wheel costs are drastically reduced in grinding carbide and ceramics — any contours can be reproduced with a few simple wheels.

An unlimited variety of forms can be produced in punches, dies, and similar work — with through, blind, or template grinding — using standard equipment and simple attachments.

The MICROMASTER® with Visual Grind provides all the extra profit-saving advantages of the new B&S 618 Surface Grinder. It can be readily used for other grinding, of surfaces up to 6″ x 14″, without disturbing the optical system.

THE VISUAL GRIND® system is manufactured by The Cleveland Grinding Machine Co. and is sold only by Brown & Sharpe. For details, write: Machine Tool Division, Brown & Sharpe Mfg. Co., Providence 1, R. I.

Brown & Sharpe PRECISION CENTER

CIRCLE INFORM-A-GRAM KEY NO. 114

Better Saw Blade Performance GUARANTEED by DoALL's built-in quality!

To guarantee the quality of DoALL Saw Blades, they must pass 83 separate control checks made at every step of the way—from raw material analysis to final package inspection. DoALL Saw Blades *must* pass every known test to prove their right to carry the DoALL label—your identification of the finest in saw blades.

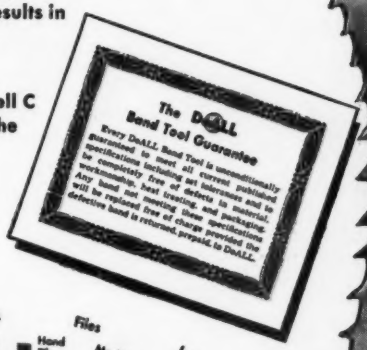
Tooth set guaranteed **within a ± .002" tolerance assures accurate sawing . . . longer cutting life . . . uniform kerf size . . . and finest surface finish.**

Sharpest, toughest, most durable teeth **are obtainable only from DoALL's modern technology and exclusive manufacturing processes.**

Shape-engineered gullets **assure smooth, uniform chip flow at faster cutting speeds. Gullet design, developed after photoelastic stress analysis, results in increased tooth strength and greater flex life.**

Controlled tooth hardness **is 61 to 63 Rockwell C for longest cutting life. Uniform tempering of the flexible back insures maximum flex life.**

SEE THE DoALL EXHIBIT
in Booth 1226 ASTE Tool Show


The DoALL
Band Tool Guarantee
Every DoALL Band Tool is unconditionally guaranteed to meet all current published specifications including set tolerances and to be completely free of defects in material, workmanship, heat treating, and packaging. Any band not meeting these specifications will be replaced free of charge provided the defective band is returned, prepaid, to DoALL.

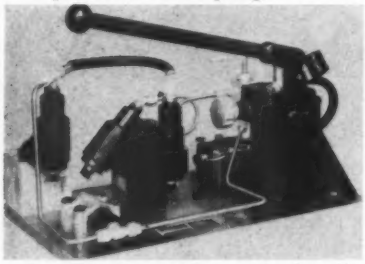
DoALL makes 18 types of band tools in more than 300 width-pitch-set combinations. Ask for the DoALL Saw Blade Selector Chart. It's free!

Did you know?
The nation's finest, fastest, most convenient and complete saw blade service is at your local DoALL Store.

SB-62

CIRCLE INFORM-A-GRAM KEY NO. 115

• Hydraulic Clamping



At Booth 1627, a hydraulic clamping system for jigs and fixtures will be demonstrated by Newton Hydraulic Tooling Co., Inc. A hand-operated pump feeds almost any number of hydraulic cylinders, with equalized pressures at each of the various holding or mounting points. This one-motion operation eliminates individual adjustment of numerous bolts and screws in a fixture. See it at the booth, or Circle Inform-A-Gram No. G7.

• Adjustable Toolholder

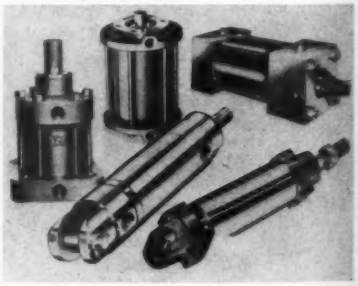
Featured at the Sandvik Steel, Inc. exhibit will be the T-Max ad-

justable toolholder for disposable carbide inserts. It has a solid carbide chipbreaker which can be adjusted easily for various cuts. See it a Booth 227, or Circle Inform-A-Gram No. G8.

• Tap With Drill Press

The Versatapper from Supreme Products Corp. can be installed on a drill press in less than a minute, converting the press for tapping holes from #10 to ½" dia in any material. It works equally well on tool steel, mild steels, and nonferrous material. See it in action at Booth 917, or Circle No. G9.

• Cylinder Line



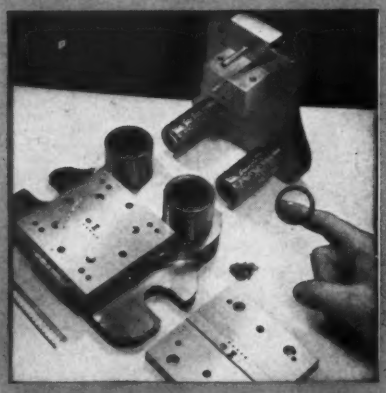
Tomkins-Johnson Co. will exhibit their line of hydraulic and air cylinders including the Squair Head and Spacemaker. They'll also show the milling cutters and riveting and clinching machines at Booth 1327, or Circle No. G10.

NOBODY SAID "It Couldn't Be Done"
BUT ONLY LEMPCO 2 POST STOCK* DIE SETS COULD DO IT!

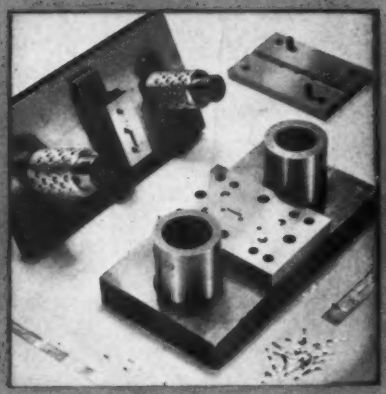
To the best of our knowledge, Lempco is the only 2-post STOCK* die set which could produce this electronics part from .001" thick high nickel alloy material—with punched holes of .001" diameter. This die, mounted in a standard Lempco STOCK* die set, produced 30,000 burr-free parts on its initial run.

Users everywhere have found that a STOCK* Lempco 2-post die set will out-produce special 4-post "friction type" sets—at a fraction of the cost. You can prove this to yourself!

*Off-the-shelf DELIVERY, with warehouse stocks in all major metalworking areas of the U.S.A.



MATERIAL: .001" Thick, High Nickel Alloy
Punched Holes, .001" Diameter



WRITE OR PHONE US TODAY
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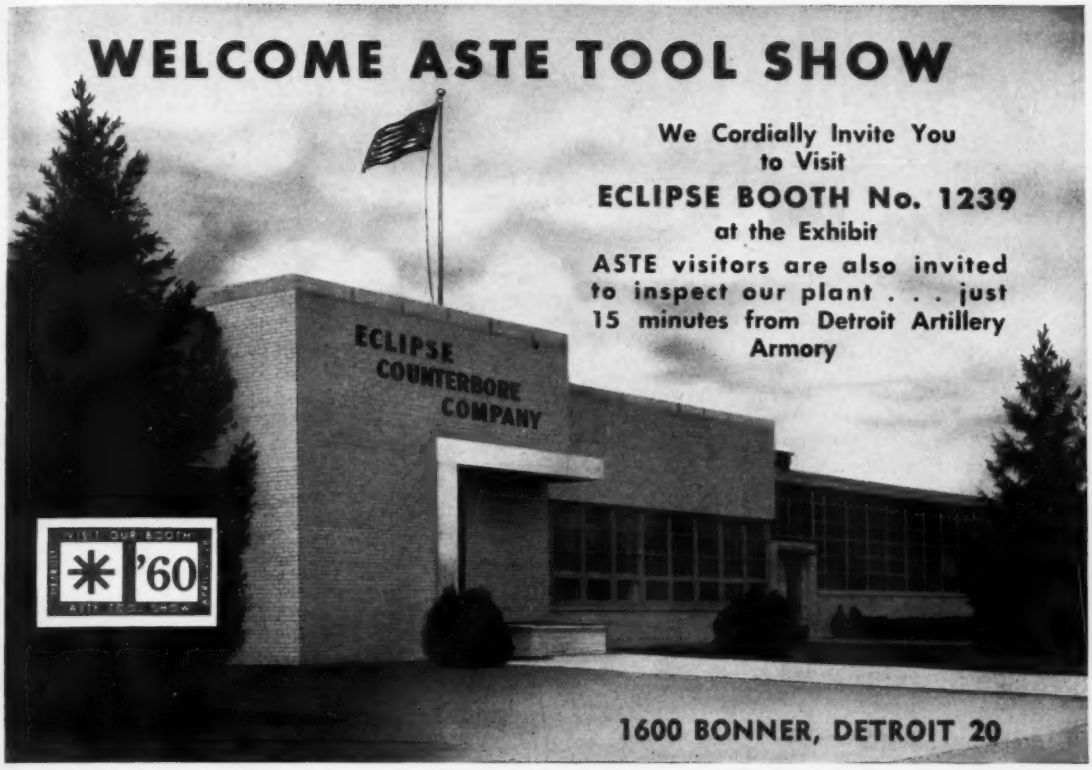

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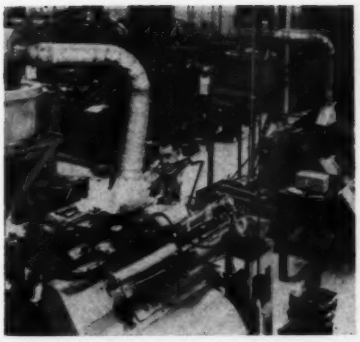

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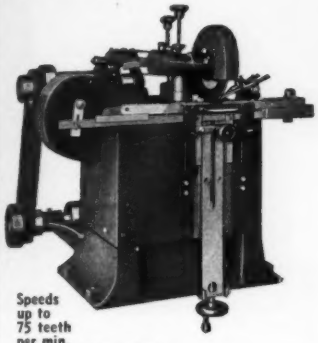

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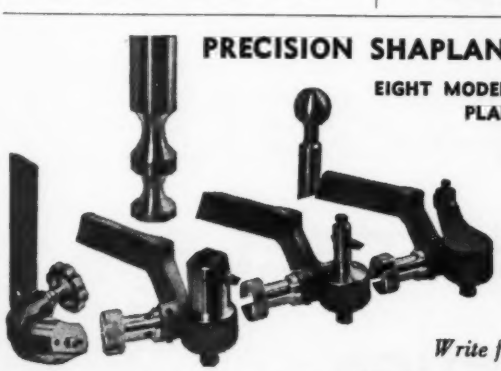

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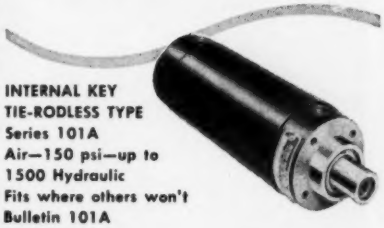

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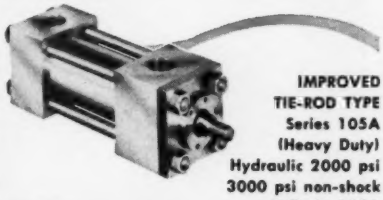

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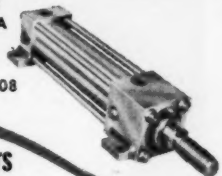

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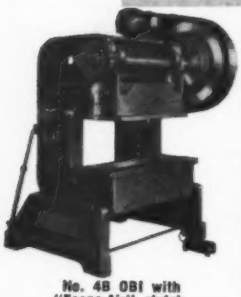

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Deaths

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W. E. Rogers, 73, former Taft-Peirce Mfg. Co. assistant secretary and general sales manager, died Feb. 13.

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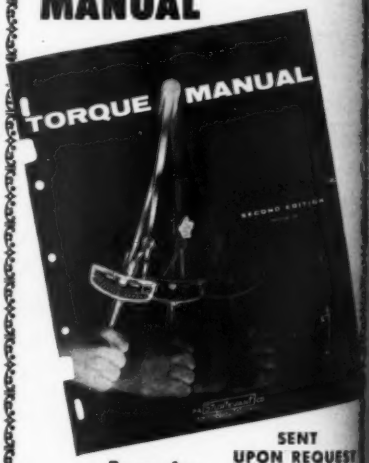

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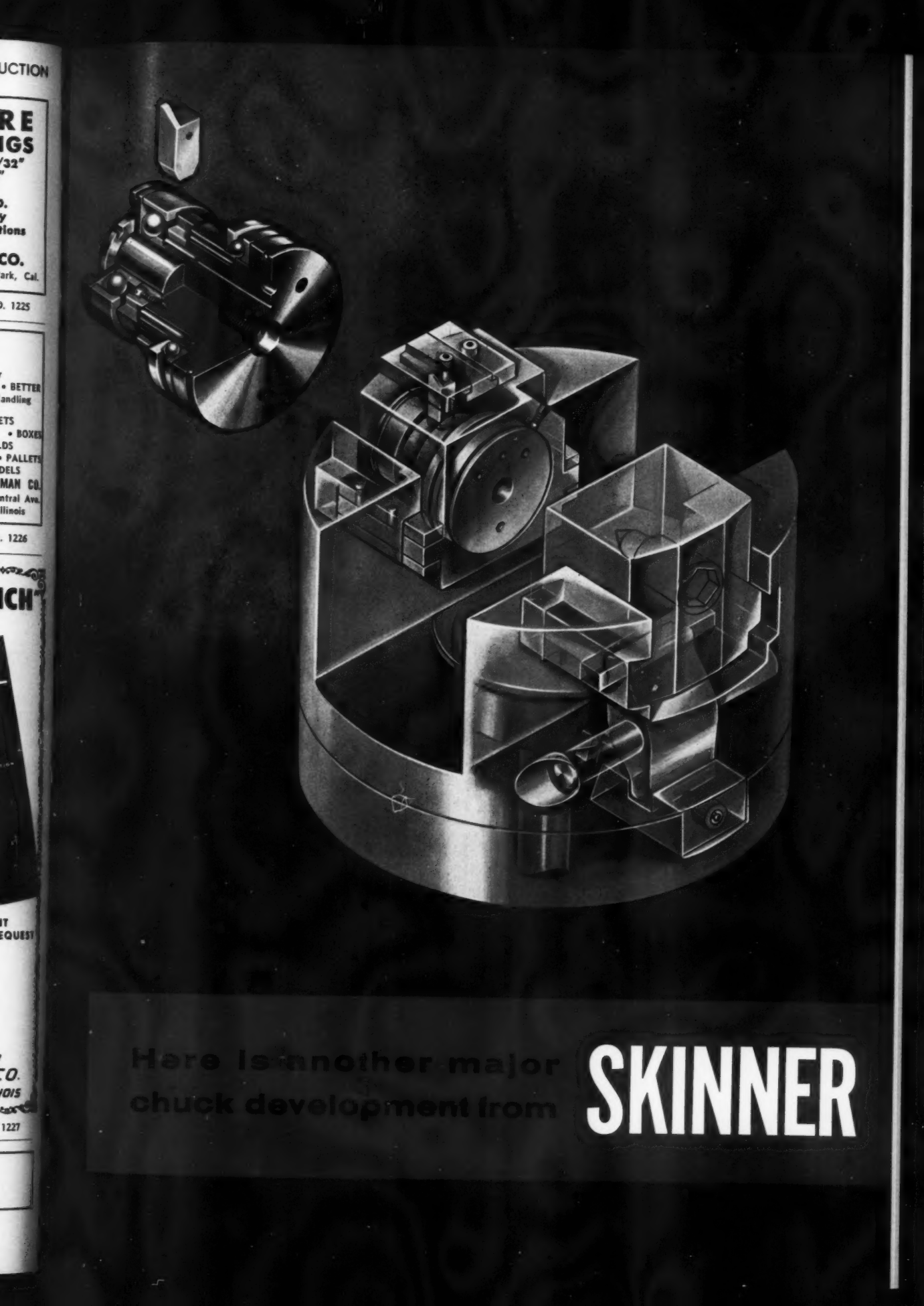
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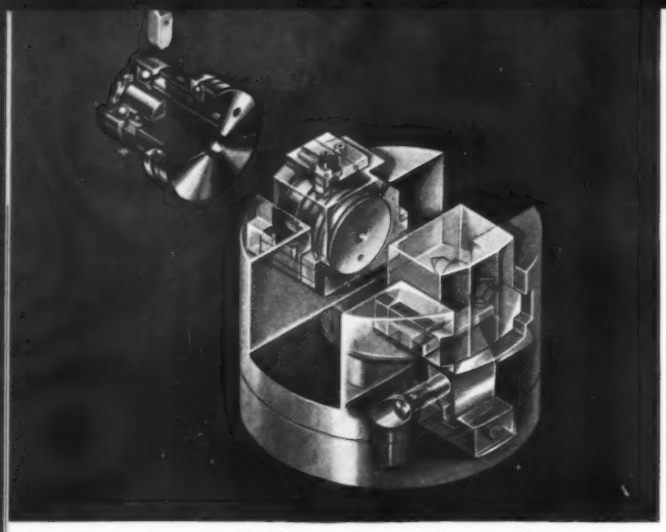

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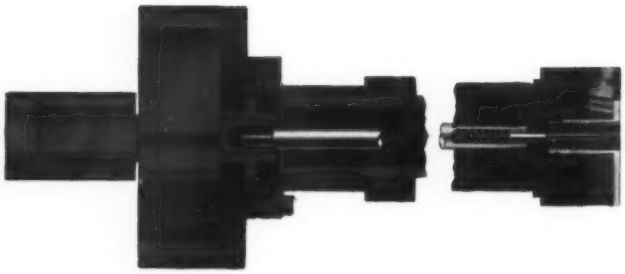

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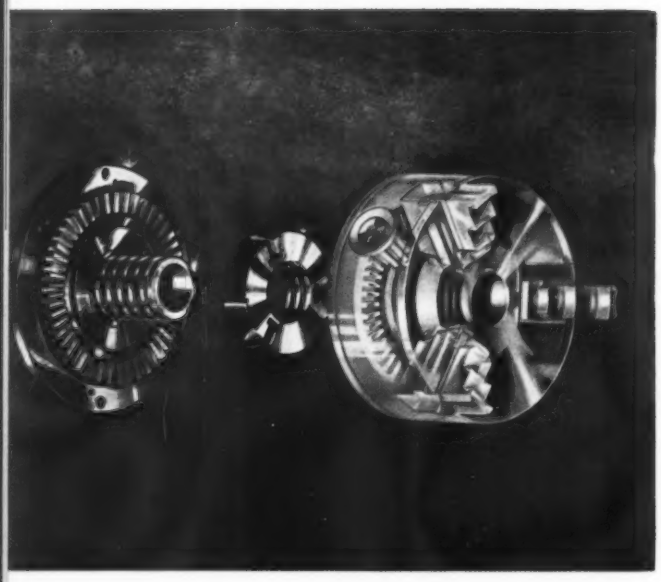

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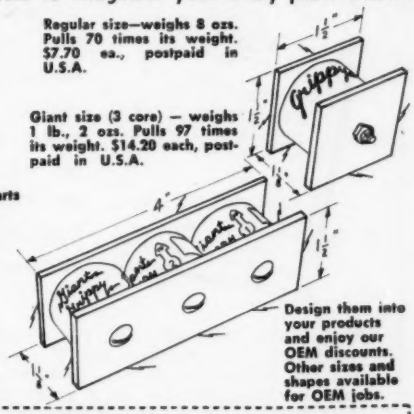

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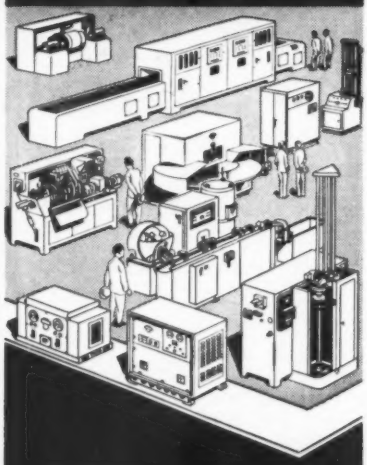

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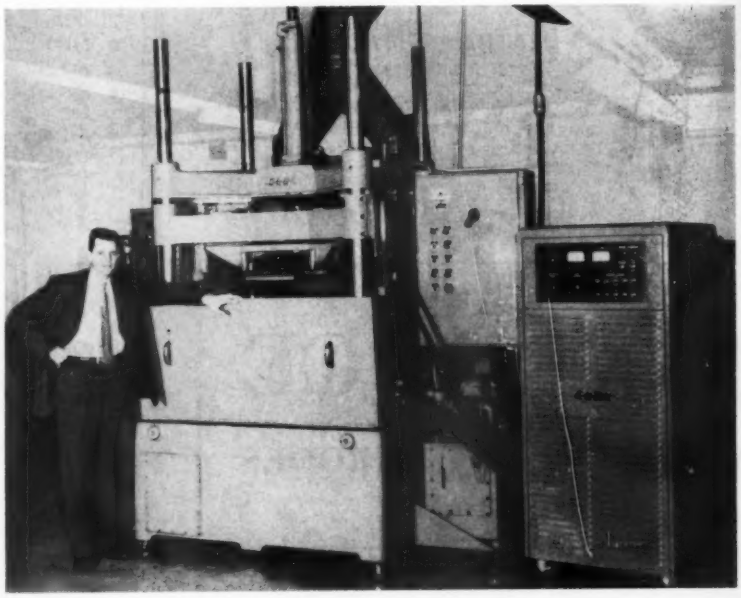
Product News

Fast Metal Removal with New Electrode

The new ER-300 roughing power supply used in conjunction with any Elox machine tool that is equipped with hydraulic feed, can remove up to 20 cu in of metal/hr. Aluminum electrodes have between 20 and 50 : 1 end wear ratio compared with the normal ratio of 3 to 1. Write Elox Corp. of Michigan, 1830 Stephenson Highway, Troy, Mich., for details, or Circle Inform-A-Gram No. P1.



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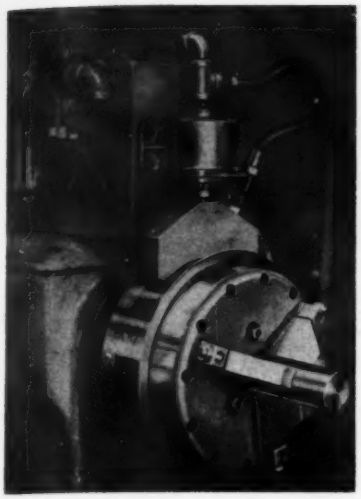
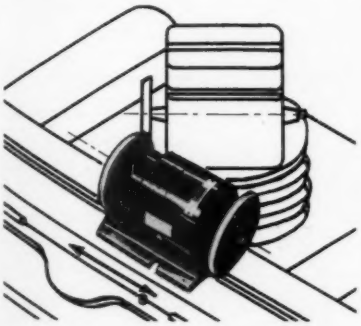
Versatile Air Coupling



A retractable air coupling features a self-contained air cylinder for power chucks with through-feed spindles. It's used with either automatically-cycled or manually-controlled bar feed machines and also facilitates machining shaft-like parts that project into the spindle. Get data from N. A. Woodworth Co., 1300 E. 9-Mile Rd., Detroit 20, or Circle Inform-A-Gram No. P2.

Diamond Wheel Dresser

A self-contained motorized diamond wheel dresser has been announced by Niagara Cutter Div'n, Bollier-Damerell, N. Tonawanda,



N.Y. Savings are realized because its motor-driven dressing wheels run opposite to or at angles to the rotation of the diamond wheel, to obtain fast, efficient cleaning and dressing. Get details from the company, or Circle Inform-A-Gram No. P3.

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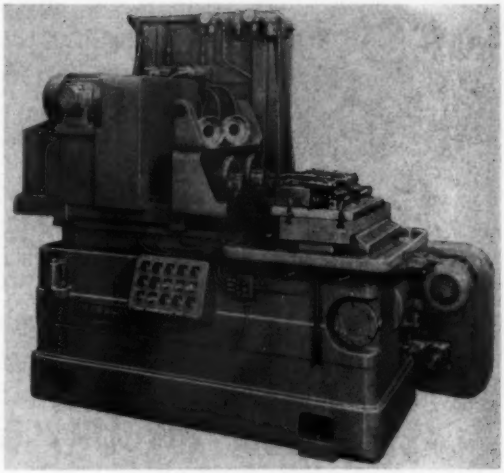
For production boring, turning, contouring, and facing operations such as taper, grooves, and chamfers, use the newly-designed air-operated cam contouring machine. Operations may be performed alone, or in any combination of sequences on Model 41. Machinery Div'n, Olofsson Corp., Lansing, Mich., or Circle Inform-A-Gram No. P4.



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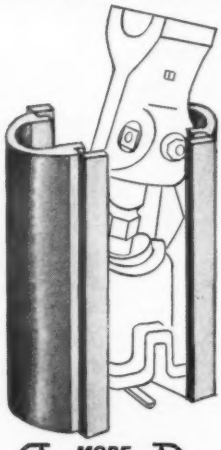
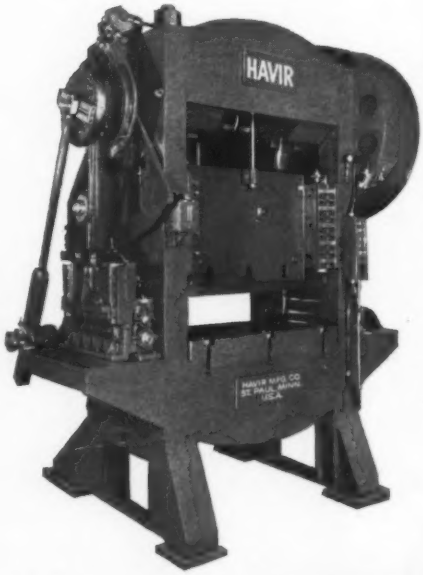


MORE BEARING FROM EVERY ANGLE



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Sales Service Mfg. Co.
2361 University Avenue, St. Paul 14C, Minnesota

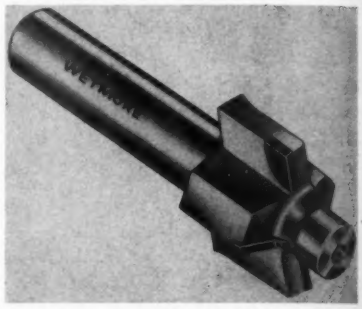
CIRCLE INFORM-A-GRAM KEY NO. 1302

Product News

New Bore Gages

Direct indicator reading, automatic bore centralization, greater precision and accuracy, and better quality control are some of the features of the BM bore gages. Three models are available from WJZ Tool Specialties, Hyde Park, N.Y., or Circle Inform-A-Gram No. P5.

Port Contour Cutters



Reduce tooling costs by using these AND 10050 port contour cutters for hydraulic fittings. The large diameter of the spot face through machines large bosses and provides extra diameter for special grinds. Get the 32-page catalog from Wetmore Tool & Engineering Co., 5320 E. Washington Blvd., Los Angeles 22, or Circle Inform-A-Gram No. P6.

Rotating Power Tumbler

For all metal cleaning applications, use the new rotating power tumbler which has an air - motor - driven rotating drum that turns at speeds from 2 to 12 rpm. Parts can be dropped easily into the drum through the large hinge door. Three sizes are available. Write Dayton Rogers Mfg. Co., Minneapolis 7, Minn., for details, or Circle Inform-A-Gram No. P7.

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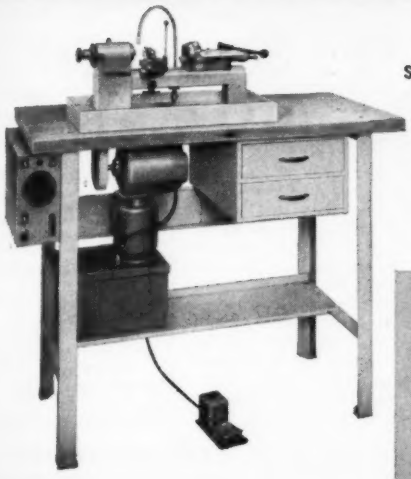

A complete Turret Lathe for small parts. Particularly useful for second operation work. Maximum collet capacity 5/16". Standard models provided with self indexing, six position turret, collet closer, double tool cross slide and variable speed control.

For full details of Turret Lathes and other Instrument Lathes send for catalog T.

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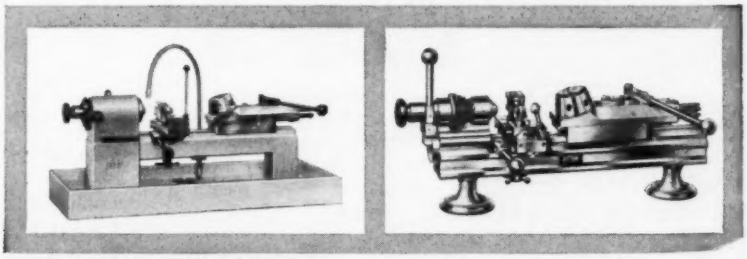

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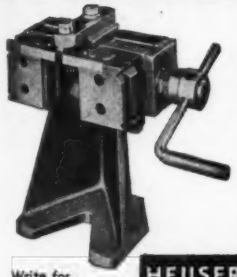

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For cross or end drilling round, hexagon, or square stock or standard or odd-shaped rough castings from 1/8" to 8" O.D., the self-centering "John's Drill Jig" will cut tooling and production costs to minimum for 10 to 100,000 pieces.

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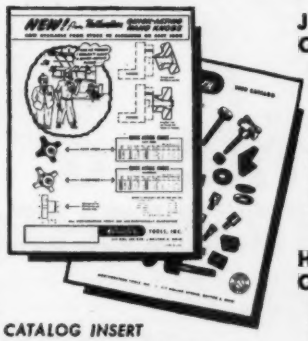

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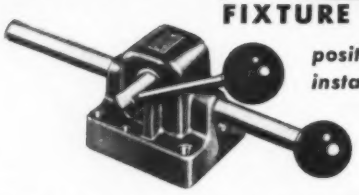
FIXTURE LOCKS



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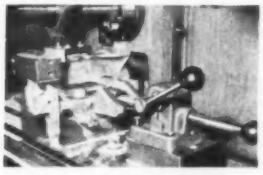

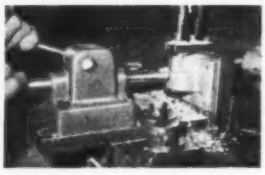

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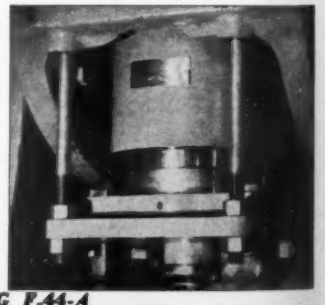

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DAYTON ROGERS *Manufacturing Company*

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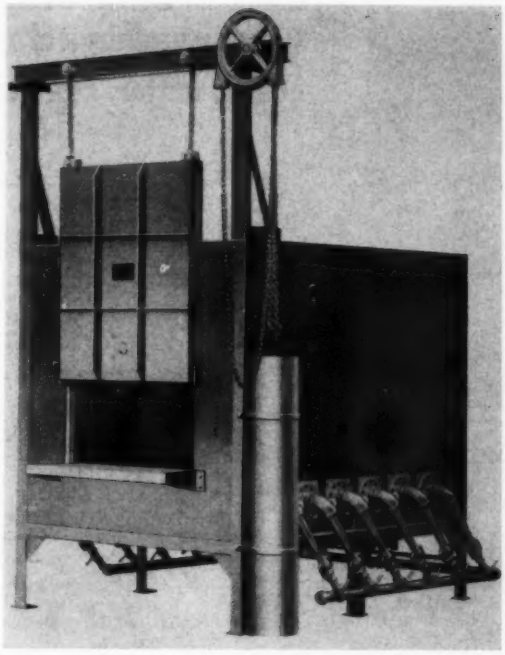
Product News

Large Furnaces

A new 30" Series of Buzzer gas-fired heat treating furnaces now meet high heat ranges and large work capacities. Model 367236 is a special size furnace with 36" x 72" x 36" inside work space. It attains quick heat-ups to 2000°F. For details, write Charles A. Hones, Inc., 2473 Grand Ave., Baldwin, L. I., N. Y., or Circle Inform-A-Gram No. P8.



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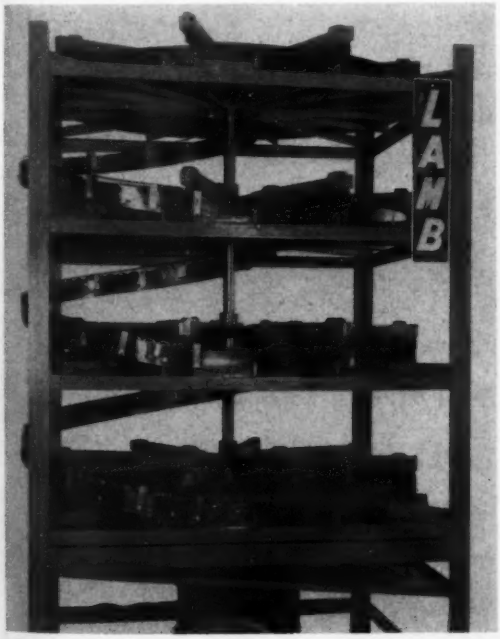
For punching, clamping, riveting, shearing, or pressing metals or plastics, use the new fully-controlled hydraulic feeds. They're powered by shop air and require no pumps or motors. Almost any sequence of operations may be performed automatically through the use of trigger valve actuators or solenoids. Get literature from Superior Controls, P. O. Box 436, Commercial Rd., Crystal Lake, Ill., or Circle No. P9.

Large Storage Feeder



Designed to blank and/or feed parts in automatic parts handling installations, this new storage feeder unit has up to 12,000 parts capacity. It maintains in-storage part orientation — first-in-first-out part sequence. Its adjustable feed rate is up to 600 parts/hr and it handles several different parts simultaneously. Models with from 1 to 6 decks, and 40" to 72" deck dia, are available from F. Jos. Lamb Co., 5663 E. 9-Mile Rd., Detroit 34, Mich., or Circle No. P10.

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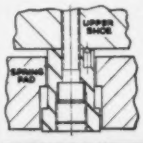

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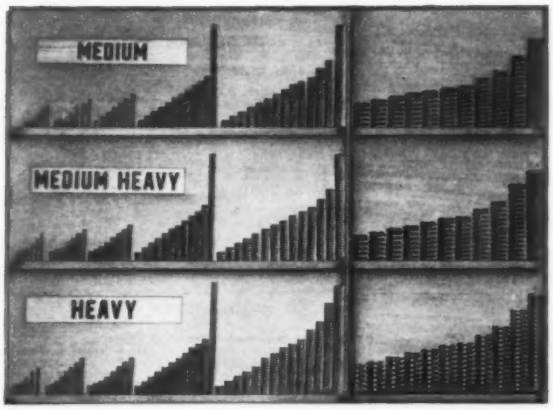

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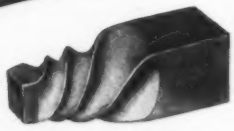

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Hardened steel makes strong, four-point, pulling grip.

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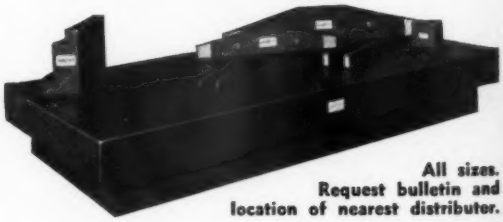
- SURFACE PLATES
- LAYOUT PLATES
- ANGLE PLATES
- PARALLELS
- STRAIGHT EDGES
- T-SLOTTED PLATES
- ANGLE IRON STANDS



All sizes.
Request bulletin and location of nearest distributor.

COLLINS MICROFLAT CO.

3249 W. El Segundo Blvd., near Crenshaw
HAWTHORNE, CALIFORNIA
ORegon 8-7694

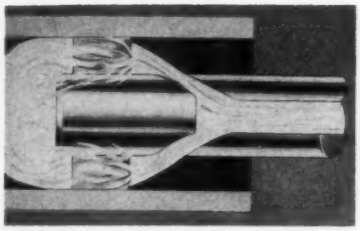
CIRCLE INFORM-A-GRAM KEY NO. 1344

Product News

Elevating Feeders Line

For feeding and orienting parts of a variety of sizes, shapes, and materials to processing or assembly machinery, use the new elevating feeder. It can discharge to the right or left at desired heights. The drive is either fixed or variable speed. Get Folder 2812 from Detroit Power Screwdriver Co., 2801 W. Fort St., Detroit 16, or Circle No. P11.

Liquid-Cooled Bars

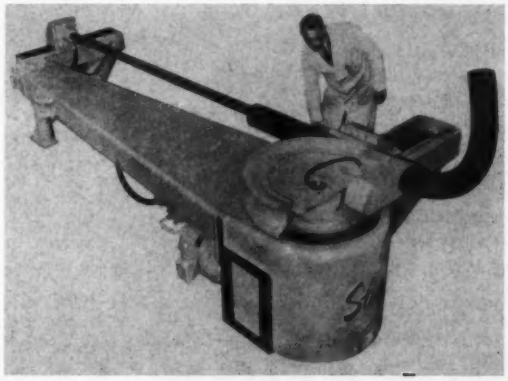


A new line of liquid cooled bars, Polar Bars, for adjustable boring and reaming cutters feature built-in veins which deliver streams of coolant directly to each of the two cutting edges. This flushes away chips and prevents heat build-up. Contact Muskegon Tool Industries, Inc., Muskegon, Mich., for details, or Circle Inform-A-Gram No. P12.

Angle Type Handpiece

For difficult finishing problems, use the new Model 55 angle type flexible shaft hand-piece. It's small and lightweight and ideal for getting into small inaccessible spots. It can be used for deburring, grinding, polishing, etc. For information, write Foredom Electric Co., Inc., Bethel, Conn., or Circle No. P13.

New Draw Benders



A new line of hydraulic draw bending machines for bending thin wall conduit and tube operate with internal mandrels and bend to very close radii. Other features include right-and left-hand bending with the same tooling and no restriction for minimum size tube. For specifications, contact Pedrick Tool & Machine Co., 3640 N. Lawrence St., Philadelphia 40, or Circle No. P14.

For PENNIES A DAY This TRICO-MIST Will Increase Production and Tool Life as Much as 500%

For drilling, tapping, milling, sawing, grinding, etc. Removes heat from cutting edges of tools and work. Feeds can be increased considerably, finer finishes and accuracy are obtained. TRICO-MIST absorbs heat, thereby quenching it faster than flood coolants which only transfer it. Chips slide freely up the tool face and are blown away automatically. Simple needle valve controls size and volume of mist spray. Attaches to shop air line. Available with one and five gallon containers—single or multiple outlets—single or dual valve control.

SEND FOR BUL. No. 37

TRICO FUSE MFG. CO.
MILWAUKEE, WIS. U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 1351

WHAT MEN AND MACHINES AT LENNOX CAN DO FOR YOU

- Design and build precision machinery
- Build machinery to your design
- Design and build special machinery and tooling to your specifications
- Production machine work: Machining and grinding
- Manufacture sub-assemblies and complete units
- Machine tool rebuilding

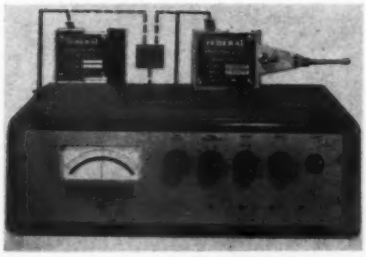
Contact us Today—No Obligation

LENNOX
TOOL AND MACHINE BUILDERS
637 N. BAXTER ST., LIMA, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1352

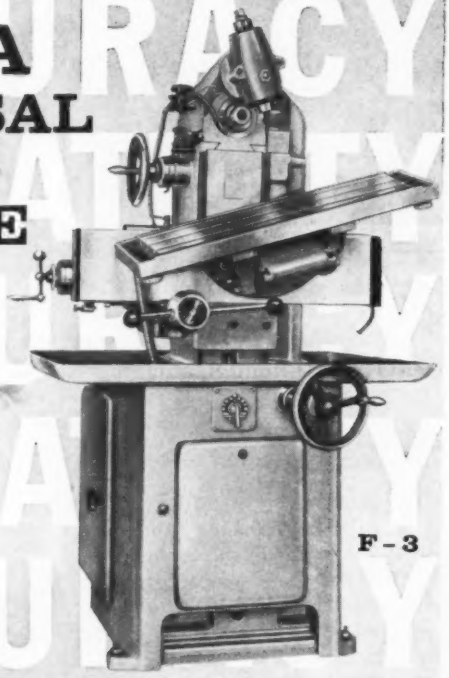
Product News

Electronic Gage-Classifier

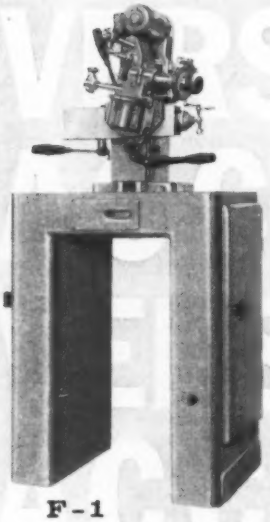


This versatile and economical electronic gaging and classifying unit has eight ranges from ±0.020″ to ±0.0001″, four size control limits, and five sorting categories. Gage heads on Model 230 M-27 can be switched to the amplifier individually, used in combination, or arranged so their outputs are additive or subtractive. Write Federal Products Corp., Providence 1, R.I., for Data Sheet 230 M-27, or Circle Inform-A-Gram No. P15.

ACIERA UNIVERSAL MILLING MACHINE



F-3



F-1

ACIERA milling machines are indeed universal in the fullest sense of the word. **ACIERA** offers you a wide variety of tables and attachments to meet your every need—**NOW** AND **ALWAYS!**

Model F-1–4″ longitudinal–5⅞″ vertical–3″ transverse

Model F-3–12″ longitudinal–12″ vertical–5¼″ transverse

Model F-4–15¾″ longitudinal–17½″ vertical–7″ transverse

See the full line of **ACIERA** milling machines and drill presses under power! Fully equipped showrooms in: Philadelphia, Pa.–Detroit, Mich.–Chicago, Ill.–Seattle, Wash.–San Francisco, Calif.–Los Angeles, Calif.

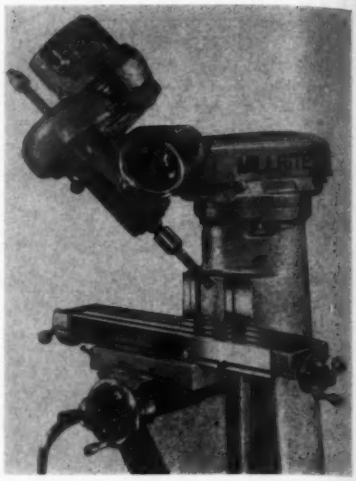
ALINA Write for illustrated brochure and the address of nearest showroom.

ALINA CORPORATION

122 East Second Street, Mineola, Long Island, New York

CIRCLE INFORM-A-GRAM KEY NO. 136

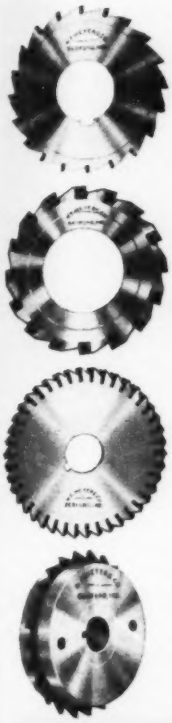
Compound Swivel Head



The new full-size dovetail ram and turret vertical toolroom milling machine now features a compound swivel head that provides for double angle settings and increases range and capacity. Millrite has a 7″ x 27″ table, 12″ ram movement, and 4″ quill travel. Get details from U. S. Burke Machine Tool Co., Brotherton Rd. at Pennsylvania R.R., Cincinnati 27, or Circle No. P16.

Improved Fabricator

Designed for punching, notching, and nibbling, particularly for prototype, short, or medium-production runs, use the new Model 15A fabricator. It features a new electro-hydramatic head which eliminates the need for pressurized air. It punches round or shaped holes up to 3½″ dia in sheet material up to ¼″ mild steel. For details, write Wales-Strippit, Inc., a unit of Houdaille Industries, Inc., Akron, N.Y., or Circle Inform-A-Gram No. P17.



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Carbide Tipped and Solid Carbide CUTTING TOOLS

It costs no more to enjoy the production advantages of MEYCO tools: "precision" minded since 1888, careful workmanship, well equipped shops and capable design engineers . . . all add up to plus values for you.

The finest quality and proper grade of tungsten carbide is engineered to the cutter's job. Tools are precision ground and lapped for long life, tipped to carefully machined bodies balanced for rigidity. MEYERS works to tolerances of .0001″, tipped cutters as thin as .030″, solid carbide cutters much thinner, diameters of ¼″ and up.

Your special problems in the field of cutting, slitting, slotting, under-cutting or form-cutting are solicited.

Write for new Cutter Catalog No. 51

MEYCO **W. F. MEYERS CO., Inc.**
BEDFORD, INDIANA
A famous name in precision tools since 1888

CIRCLE INFORM-A-GRAM KEY NO. 1371

DUSTKOP "520"

designed to collect dust from single machines

portable— easily installed

DUSTKOP STOPS DUST

Self-contained Dustkop models, like the "520," are practical and effective in collecting dust from single machines. They're designed specifically for service with surface grinders, tool and cutter grinders, offhand grinders, buffers and other small wheel equipment. These units are also easy to install — are actually portable — and very economical to operate.

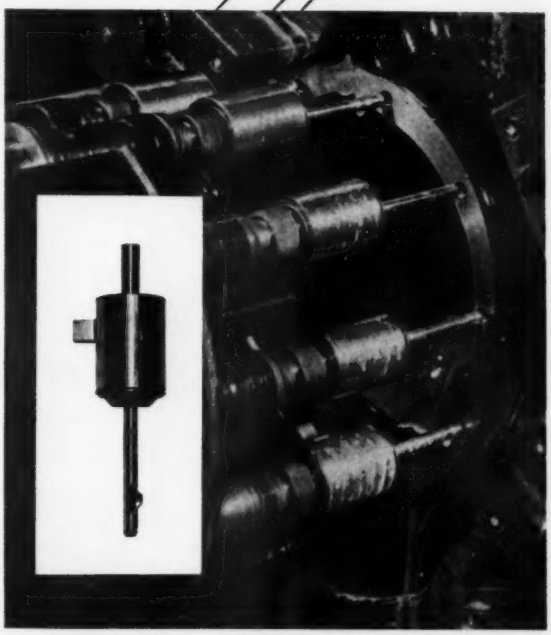
Write for illustrated literature
46 models to choose from!

NEW DUSTKOP AUTO SHAKER
shakes filters AUTOMATICALLY

AGET manufacturing company
1394 E. Church Street, Adrian, Michigan
ask for details

CIRCLE INFORM-A-GRAM KEY NO. 1372

HOW TO DEBURR 10 HOLES IN A BANJO* AT ONE TIME!



NOBURMATIC "H"

deburrs front & back faces in one automatic operation

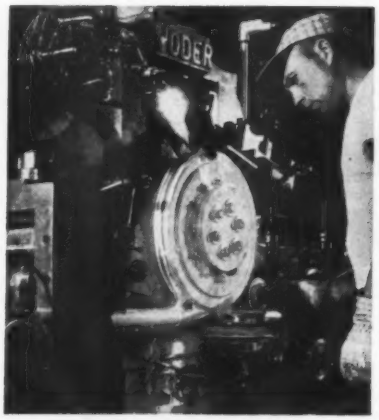
10 NOBURMATIC "H" tools *automatically* deburr *both* sides of holes in an **automobile "banjo" housing.* NOBURMATIC "H" is designed to *completely* deburr and chamfer the front and back faces of accessible *or* inaccessible holes. Ideal for mechanized or automated machine tools, the self-actuating NOBURMATIC "H" with its positive-action mechanism, not dependent on any spring setting, assures unmatched performance for the volume producer. Adaptable to manual usage in conventional drill presses and in-line drilling operations.

WRITE FOR FREE FOLDER
Send TODAY for complete details on NOBURMATIC "H" and other cost saving tools. *Improve quality, increase production and lower cost with NOBUR tools.*

NO BUR TOOLS **NOBUR** MANUFACTURING CO.
6860 Farmdale Ave., No. Hollywood, California

VISIT OUR BOOTH NO. 2235 — A.S.T.E. TOOL SHOW

CIRCLE INFORM-A-GRAM KEY NO. 1373



Yoder Tube Mills speed tailpipe production at AP Parts Corporation

The AP Parts Corporation (Toledo, Ohio), world's largest producer of replacement mufflers and tailpipes, uses 2 YODER Tube Mills to produce more than *300* ft. of 1¾", 1⅞" and 2" tubing per minute.

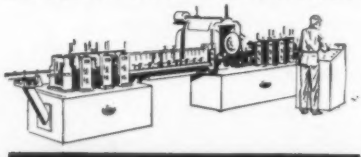
According to Mr. John Grindle, Plant Engineer, the two-man operated YODER Mills are vital to the production of the entire plant. "YODER Tube Mills earn their keep daily. They are easy to set up, maintain and operate ... the welds are clean and uniform. We depend on them for constant quality, high production and minimum downtime".

The YODER Tube Mills at AP Parts exemplify the production economies and dependability of all YODER-built equipment, whether it be Pipe and Tube Mills, Cold Roll-Forming Machinery or Slitting Equipment.

If your products require ferrous or non-ferrous pipe or tubing, from ¼" to 26" diameters, there is a YODER Mill designed to produce it economically, accurately and efficiently.

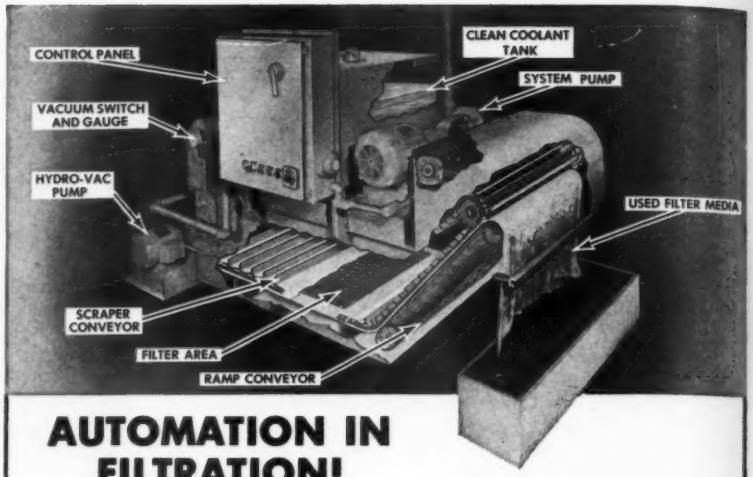
For complete information on YODER Pipe or Tube Mills ... write for the fully illustrated, 88 page YODER Tube Mill Book ... it is yours for the asking.

THE YODER COMPANY
5501 Walworth Avenue • Cleveland 1, Ohio



ENGINEERING YODER MANUFACTURING — PIPE AND TUBE MILLS (ferrous or non-ferrous)

CIRCLE INFORM-A-GRAM KEY NO. 1381



AUTOMATION IN FILTRATION!

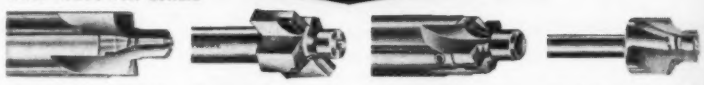
- Completely automatic operation
- Used with individual machines
- Compact — with low liquid inlet
- Low operating cost
- Fine degree of filtration
- Pressure and vacuum forces act on filter media
- Any coolant — any sludge

HYDROMATION FILTER CO.
19661 Schoolcraft Detroit 23, Michigan VErmont 8-0492

CIRCLE INFORM-A-GRAM KEY NO. 1382

IMMEDIATE DELIVERY OF CONTOUR CUTTERS For Standard Hydraulic Fittings ... *In Stock*

AND 10050 Port Cutters



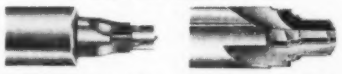
Turret Lathe and Drill Press Series: Carbide Tipped, integral reamer

Economy Series: Carbide Tipped, integral end pilot

Versatile Series: Carbide Tipped, interchangeable end pilot and reamer

High Speed Steel Series: Integral end pilot, Super H.S.S.

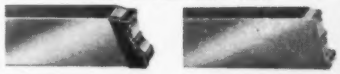
"MS" Port Cutters



MS 33514: Carbide Tipped integral end pilot

MS 16142 "SAE": Carbide Tipped interchangeable end pilot and reamer

External Flat Form Tools



MS 33656 E and G; MS 33657E and S Stocked in Carbide Tip and H.S.S.

MS 33514E; MS 33515E and S Stocked in Carbide Tip and H.S.S.

Wetmore stocks the fullest line of Port Contour Cutters and Flat Form Tools for Standard Hydraulic Fittings to assure fast delivery. Where required, modification of standard contours can usually be made within 48 hours.

For Special Cutting Tools, Wetmore offers the finest design and manufacturing facilities backed with extensive experience to combine operations and also to machine "problem parts."

Write for NEW Free Catalog.

Wetmore Tool and Engineering Co.
5320 E. Washington Blvd., Los Angeles 22, California

Wetmore Tools

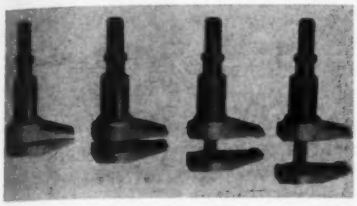
Boring Tools | Reamers | Core Drills | End Mills Routers | Port Contour Cutters | Form Cutters | Milling Cutters | Special Cutters

CIRCLE INFORM-A-GRAM KEY NO. 1383

Product News

Versatile Fastener

This heavy-duty side-grip fastener is adjustable for material from 0″ to 15/16″ thick. By adjusting



its heavy-duty spring, varying spring pressures are provided. Price list is available from Monogram Mfg. Klecko Div'n, 8557 Higuera St., Culver City., Calif., or Circle Inform-A-Gram No. P18.

Portable Coolant Pump

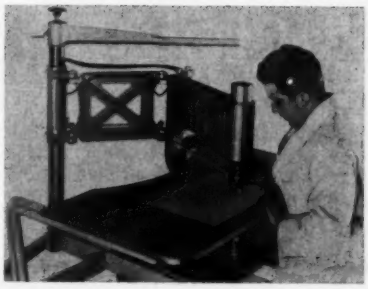
To improve finish and increase tool life, use this low-cost self-contained portable coolant pump. Its light weight, low profile construction makes for easy handling. A 3000 rpm fan-cooled motor delivers 190 gals/hr at 4′ head. The Dunham Tool Co., Inc., New Fairfield, Conn., supplies data, or Circle Inform-A-Gram No. P19.

Mechanical Load Indicator

Press strain, the indicator of die wear, misalignment, fatigue, and processing load, can now be measured visibly and mechanically by the Dial-A-Load device. It's welded or bolted to the press frame and needs no electronic or electrical circuits. Contact Lebow Associates, Inc., 14857 W. 11-Mile Rd., Oak Park 37, Mich., for details, or Circle No. P20.

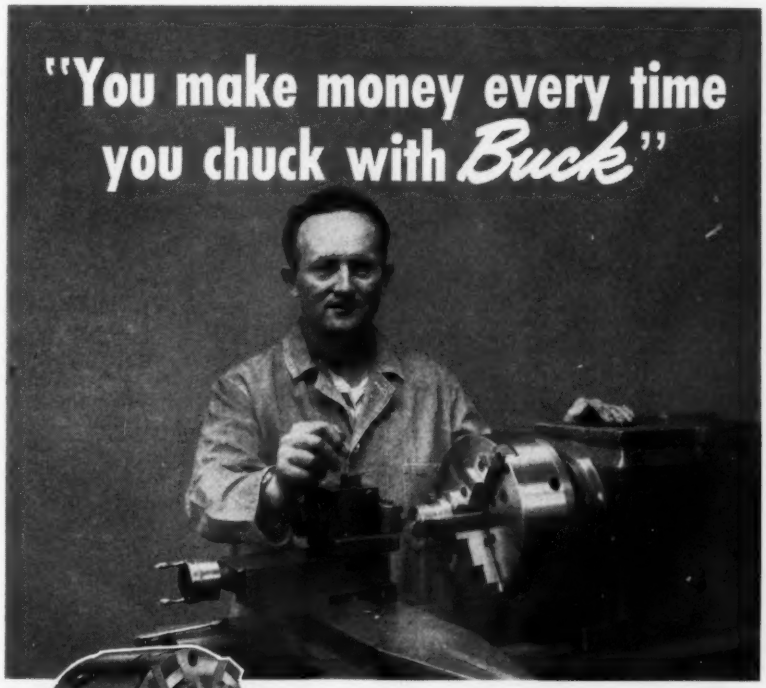
Torch Cutting Duplicator

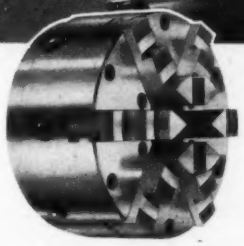
This easy-to-operate torch cutting duplicating machine for single or batch cuts utilizes four simple methods of operation—cutting to sheet metal template, cutting direct from drawing, circular cutting, and straight cuts in desired direction. It's used to cut any shaped sections from iron plate 0.118″ to 4″ thick.



For data, write Milo Mfg. Co., 259 N. Broad St., Elizabeth, N.J., or Circle Inform-A-Gram No. P21.

"You make money every time you chuck with *Buck*"





The original 6-jaw chuck...

Buck originated the 6-jaw Ajust-Tru® chuck and, though others have tried, none can equal the Buck in precision with speed.

Here's why...

You save labor time. Any experienced chuck operator can adjust the Buck to dead true precision *within one minute!*

You save re-chucking time. The *exclusive* Buck Ajust-Tru® principle *guarantees .0005″ precision* chucking duplicate parts.

You save replacement costs. The Buck automatically compensates for wear to give you far longer precision work-holding than obsolete design chucks—*yet cost no more!*

Send for catalog. See why, in *every* way —"It pays to chuck with Buck."

Makers of Scroll, Power, Dust Proof, Independent Chucks.

TOOL SHOW — BOOTH 821

BUCK TOOL COMPANY

418 SCHIPPERS LANE • KALAMAZOO, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 139

Product News

Portable Hardness Tester

Because it can be fitted with an electromagnetic or chain clamp, this Indentometer can make Rockwell tests in the factory or field. The clamp can be applied to flat or curved surfaces, large work, and ferrous or nonferrous metals. Get details from Steel City Testing Machines, Inc., 8817 Lyndon Ave., Detroit 38, or Circle Inform-A-Gram No. P22.

NEW Gear Hobbing Machine Is Fully Automatic!

Koepfer 170 Gear Hobber

Koepfer 170

Hobbing of spur, helical and worm gears; worms; or any profile that can be generated . . .

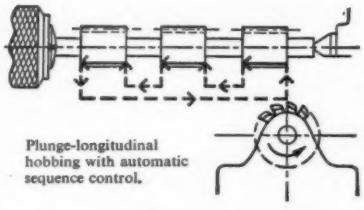
Magazine feeding attachment providing fully automatic loading, chucking and hobbing—greatly reducing machine set-up and handling time . . .

Semi-automatic operation for small runs—with foot pedal opening chucking device . . .

Automatic sequence control—permitting pre-selection by control switches for either longitudinal hobbing, plunge hobbing or combined plunge-longitudinal hobbing.

	without magazine feed	with magazine feed
Max. pitch to be cut	DP 10	DP 10
Max. dia. of blank	5⅛"	1¾"
Largest face	6"	4⅜"
Min. teeth to be cut	6(1)*	6(1)*

*Special attachment for cutting less than 6 to single-start worms



Plunge-longitudinal hobbing with automatic sequence control.

COSA

Importers of Leading Precision Machine Tools
Nationwide Sales and Service
COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

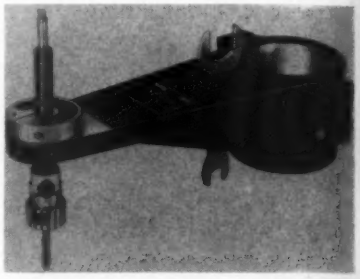
IN CANADA contact COSA CORP. OF CANADA, LTD., 1160 Lakeshore Rd., Long Branch, Toronto 14, Ont.

CIRCLE INFORM-A-GRAM KEY NO. 140

Improve Gun Drilling

This line of solid carbide bushings was designed for gun drilling applications where excessive wear, rigid support, and alignment are important. They're made to exact clearance requirements and hold true to size—up to 50 times longer than steel. The carbide support improves cutting tool performance, extends tool life, and cuts inspection time, downtime, and scrap. Ask for data from S & E Machine Products, Inc., Bridgeport, Mich., or Circle No. P23.

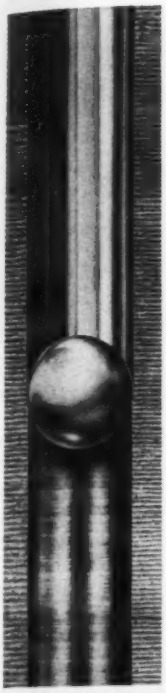
Precision Hole Tapper



With this new line of Auto-Tap lead screw tapping attachments even unskilled operators can tap holes precisely. They can be used in any reversing type head to convert drill presses into precision tapping machines. For data, write Ettco Tool & Machine Co., Inc., 594 Johnson Ave., Brooklyn 37, N.Y., or Circle No. P24.

Coil Stock Straighteners

The Economy Coil stock straighteners are now-powered and can be used with almost any automatic feed. Four hardened and ground straightening rolls take the curvature from stock. They come in 6", 12", and 18" stock width sizes. For details, write Cooper Weymouth, Inc., 600 Honeyspot Road, Stratford, Conn., or Circle No. P25.



GOOD HOLES MADE BETTER

For holes requiring *additional accuracy, smoother finish,* or *greater wear resistance,* BALLIZING is the answer — and only ballizing gives *all three* of these advantages.

This process is also *faster* and far *less costly* than any other method of final hole sizing and finishing.

Investigate! WRITE TODAY for FREE 16-PAGE BALLIZING BULLETIN. It describes the process fully; gives cost and production data.

INDUSTRIAL TECTONICS, Inc.

ITI

MANUFACTURERS OF PRECISION BALLS AND BEARINGS
3697 JACKSON ROAD
ANN ARBOR, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1411

Screws Into Stop Rod

NEW STOP GAGE

FOR TURRET LATHES

Holds Tolerances to .0005"

New patented Ladco Stop Gage is easily installed—saves time and trouble in set up! Cuts rejects! Accurately positions longitudinally, tooling mounted on cross slide. Ladco Stop Gage available with Waterproof Indicator and also with .0001" Indicator.

LAD GAGE COMPANY
BOX "A" GEAUGA LAKE, OHIO

Write for FREE BULLETIN and Prices

CIRCLE INFORM-A-GRAM KEY NO. 1412

SPELLMACO SPOTTERS

A matched set of transfer punches for toolmakers, machinists and tool cribs.

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel carefully heat treated and tempered for long life. .0025 undersize to facilitate use—black oxide finish.

Set No. 3-17: 28 punches with indexed stand — sizes 3/32" to ½" by 1/64" plus handy 17/32" size—length 4⅞". PRICE only $19.40

Single sizes available.

R. L. SPELLMAN CO. • Urbana, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 1413

NEW LOWER PRICED MAGNETIC RETAINER DESIGN

can reduce production operations 50% or more

- New punch and die retainer design decreases overall size.
- More holes can now be pierced in one operation within a given area, in numerous applications.
- Can be used with all existing Whistler Magna-Die equipment.
- Creates substantial savings in tooling costs.
- Cuts punching operations in half or even more, in many instances.

WHISTLER W.S MAGNA DIE REG T.M

SEE IT IN ACTION

along with other Whistler achievements in Adjustable and Custom Built Dies, in

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write now for NEW MAGNA DIE BULLETIN M-60 available soon

S. B. WHISTLER & SONS, INC.

748 Military Rd., Buffalo 23, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1414

M1238-1818 — *Range 18" x 18", working distance 9" to infinity. Reads to 0.001" up to 24" working distance. Protractor ocular reads to 3 minutes of arc. Image is erect.*

Cut inspection time in half

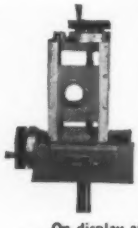
with new Gaertner Coordinate Cathetometers

These convenient, reliable optical instruments permit making precise coordinate measurements in a vertical plane. The two dimensions are measured with one setting, object does not have to be rotated. Inspection time is cut in half and resetting errors eliminated.

Versatile Gaertner Coordinate Cathetometers are ideally suited for precision measurements on large objects; also objects or points in recessed, remote, or inaccessible locations. Applications include measuring jet engine sections, complicated castings, printed circuits, bolt holes and bosses on large piece parts, traces on cathode ray tubes, etc.

Because these are optical rather than mechanical measuring instruments, you make non-destructive measurements without contact, distortion, or concern about pressure being applied to the object when making a setting. Instruments available in English or Metric system.

M1236-46— Horizontal range 6", vertical range 4". Reads to 0.0001", working distance 5" to infinity.



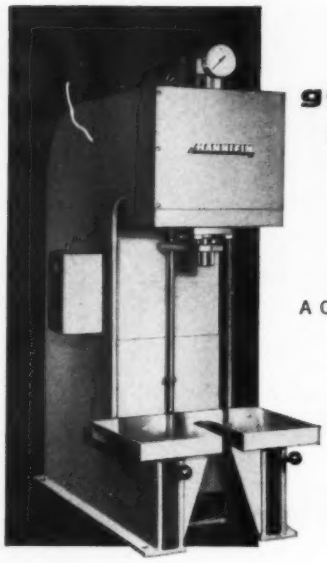
M1236-22— Range 2" x 2", reads to 0.0001". Working distance 5" to infinity. Shown with 19 mm mounting rod, and without telemicroscope. Instrument permits precise coordinate movement of other objects such as photo cells, probes, etc., in place of telemicroscope.

On display at ASTE Tool Show, Detroit Armory, Booth 845, April 21-28

The Gaertner Scientific Corporation

1242 Wrightwood Ave., Chicago 14, Ill.
Telephone: BUckingham 1-5335

CIRCLE INFORM-A-GRAM KEY NO. 1421



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Our quantity production gives you highest quality at lowest cost.

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Dual Safety Hand Lever Controls	Assembly Operations
Dual Electric Push-Button Controls	Riveting — Staking
Adjustable Stroke Control	Forming — Stamping
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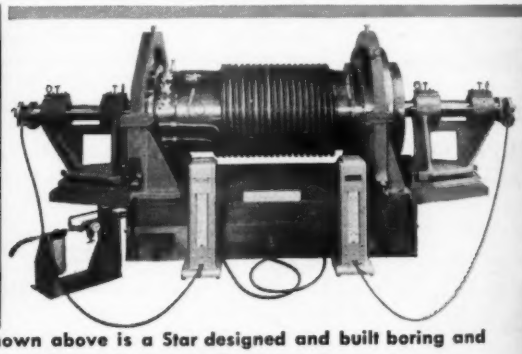
Call in your nearby Hannifin man—he's a trained production analyst—to prove how you can do more at lower cost with Hannifin presses. Or, write for our new Bulletin 132A. It tells the whole story.

HANNIFIN COMPANY

563 South Wolf Road • Des Plaines, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1422

STAR PRECISION TOOLING



Shown above is a Star designed and built boring and checking fixture for a canned motor pump.

When the finest in tooling is required . . . specify STAR. Designers and builders of dies, jigs, fixtures, gages, special machinery. Development work. Precision machined parts and unit assemblies. Nuclear and missile components.

Send us your prints for a quotation.

STAR MACHINE & TOOL CO.

9320 Woodland Ave • Cleveland 4, Ohio GArfield 1-2060

CIRCLE INFORM-A-GRAM KEY NO. 1423

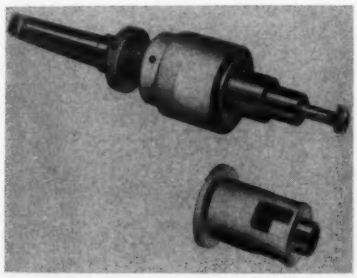
Product News

Dial Groove Gages

Obtain instant, accurate readings of internal groove dimensions without removing work from the machine and without the use of a micrometer, using a new E-Z dial groove gage. Simple lever action and easy-to-read dial indicator provide a 0.2" to 1.6" measuring range. Get details from Maxwell Industries, Inc., 493 E. 5th St., Ashtabula, Ohio, or Circle Inform-A-Gram No. P26.

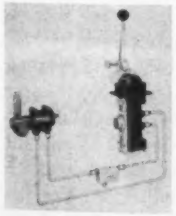
Automatic Recessing Tool

An interchangeable snap-on work pilot adaptor is featured on the new type automatic recessing tool. This permits piloting the tool



in the work as well as in a fixture bushing. It's used on lathes, automatic screw machines, and other machines where work is rotating. Write Madison Industries, Inc., P.O. Box 1137, Providence 1, R.I. for details or Circle Inform-A-Gram No. P27.

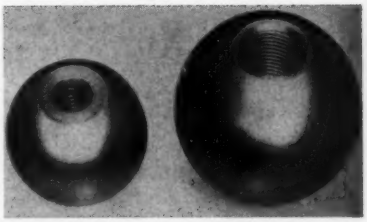
New Vernier Control



A remote control system that is a manually-operated hydraulic linkage for accurately positioning, controlling, and duplicating movement at a distance now features a vernier lock that permits precise lever travel of ± 5° for applications requiring very accurate positioning. The system is used for control valves, clutches, brakes, and throttles. Write Hydronic Corp., 12685 Arnold, Detroit 39, for data, or Circle Inform-A-Gram No. P28.

Steel Ball Knob Line

Durable, steel ball knobs can be drilled and tapped as required for screw-on attaching to handles, gear shifts, levers, for use on machine



tools, jigs, and fixtures. They're made of mild steel and come in 1½" and 2" dia sizes. For details, write Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland 10, or Circle Inform-A-Gram No. P29.

THE SAW
JOHNSON
JOHNSON MODEL 'J'
Johnson Model J (Wet or Dry) Cuts anything in your stock pile. 10" rounds, 18" flats, structurals or odd shapes. Centralized controls, special safety features, variable speeds.
that costs you NOTHING!

True, you pay the low initial purchase price, but the big, rugged Johnson Model J is so well engineered, so dependable, so troublefree—so versatile, fast and accurate, that it quickly pays for itself in tangible savings. One Johnson metal cutting band saw . . . or a battery of them, will pay you big dividends in time, labor—smooth production and eliminate scrap.

Write Today . . . for your copy of the new Johnson catalog.
All models and accessories described, illustrated in full.

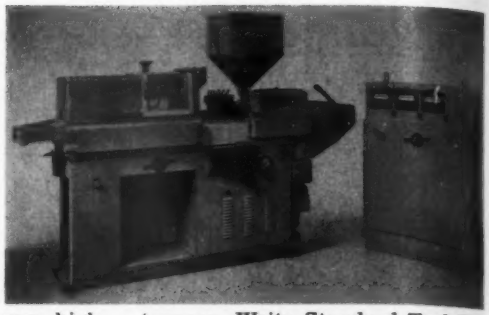
Johnson MANUFACTURING CORPORATION
1015 Barnes Street Albion, Michigan
CIRCLE INFORM-A-GRAM KEY NO. 143

Product News

New Type Fasteners

Numerous types of Speed Nut fasteners can fit almost any fastening job and they are easily installed. For special jobs, special fasteners can be designed to meet requirements. For more data, write for Bulletin 353 from Tinnerman Products, Inc., Cleveland 1, or Circle Inform-A-Gram No. P30.

Injection Molding Machine



Produce 1,000 6-oz thin-wall containers an hour from a single mold using this fully automatic 2-oz injection molding machine. The Autoholder, Model 100T, features simplicity of design, full hydraulic clamp, high speed production, and low maintenance. Write Standard Tool Co., Leominster, Mass., for information, or Circle Inform-A-Gram No. P31.

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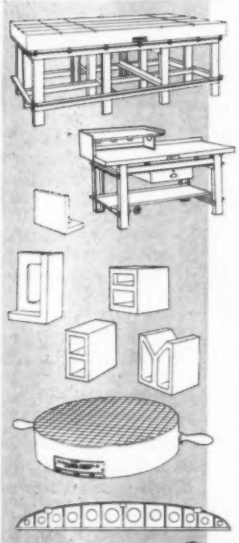
HERE ARE OVER
300 AIDS to
PRECISION
PRODUCTION



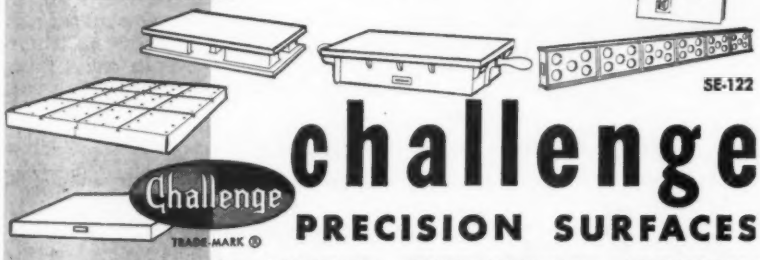
More than 300 different items are available in the Challenge Precision Surface Equipment line to help you maintain close control of accuracy in your tooling, manufacturing assembly and inspection operations.

These include both Granite and Meehanite Surface Plates of all types and sizes. Also Meehanite Angle Plates, V-Block, and many other items of precision surface equipment. In addition, many special sizes and types can be made-to-order.

Take this important step toward cutting costs and minimizing rejects. Get information on Challenge Precision Surface Equipment to improve your operations.

SEND FOR THIS HANDY FREE CATALOG covering description and prices on all standard items.

THE CHALLENGE MACHINERY CO.
GRAND HAVEN, MICHIGAN



SE-122

Challenge TRADE-MARK ®

challenge
PRECISION SURFACES
for LAYOUT • INSPECTION • ASSEMBLY

CIRCLE INFORM-A-GRAM KEY NO. 144

New Weighing System

For weighing the contents of bins, conveyor loads, or anything else that can be weighed on platform scales, use the new Weber Air-Mount weighing system. It handles loads from 0-300 lbs to 0-200,000 lbs. It's quick and easy to install (takes about an hour); changes in floor construction are unnecessary. Get literature from Weber Air-Weigh Co., 13845 Elmira, Detroit 27, or Circle Inform-A-Gram No. P32.

Hardening Compound

A new chromizing and alloying steel hardening compound is nonpoisonous and contains no cyanide. It's used for tool and high speed steels as well as mild and low carbon steels. Just heat the tool, dip and roll it in Chromelloy powder, reheat it, and quench it. For details, write U.S. Metallurgical Laboratories, 50 E. 41st St., New York 17, or Circle No. P33.

STRIKE

Don't Settle for less than these "ten" CARR-LANE STAR PERFORMERS
most are new—some are old friends
—all are ready to save you time and money

KNOB SHOE ASSEMBLY Perfect Seating Threaded ball permits easy removal of shoe
PRECISION MADE
RUST PROOF BLACK FINISH
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ECCENTRIC LEVELING LUGS by turning the eccentric pad is brought in line
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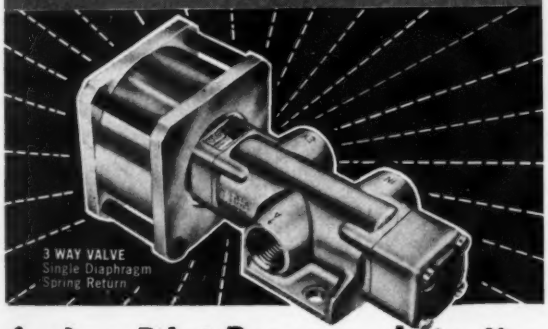
CIRCLE INFORM-A-GRAM KEY NO. 1451

VERSA Diaphragm Actuated Valves



for Low Pilot Pressure Actuation

■ Versa Diaphragm Valves can be actuated by pilot (or signal) pressures as low as 5 PSI on double diaphragm types and as low as 10 PSI on standard spring return models.

Versa Diaphragm Valves are available with side port bodies or for manifold mounting, and in sizes from 1/8" thru 1" NPT in 2-, 3-, 4-, and 5-way types, and for pressures from partial vacuum to 500 PSIG.

All Versa Valves are triple pressure and functionally tested under water for guaranteed leakproofness.

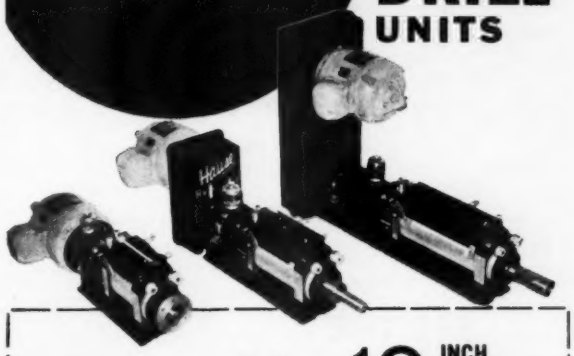
VERSA

■ Write Today for your free copy of bulletin 259

VERSA PRODUCTS COMPANY INC.
150-T COOLIDGE AVENUE
ENGLEWOOD, NEW JERSEY

CIRCLE INFORM-A-GRAM KEY NO. 1452

NEW HOLOMATIC DRILL UNITS



with 4" – 6" or 10 INCH STROKE CAPACITY

To meet your ever increasing production tempo, Hause has developed two new drill units with 6" and 10" stroke capacities. As was the original time-proved 4" stroke model, the new Holomatic drill units are completely self-contained reciprocating quill type power devices for use on *production drilling, reaming, centering, facing,* etc. They can be used individually or in groups with manual or full automatic cycling. Units are air actuated, precisely controlled hydraulically. Available with six standard drives, motor horsepowers to 2 H. P., spindles are interchangeable for single or multiple head applications.

- **Concentric construction assures accuracy, longer life**
- **Honed, polished and chromed thrust piston and quill**
- **Up to 3600 four-inch stroke cycles per hour**
- **Automatically filled hydraulic system**
- **Built-in hydraulic oil filter system**
- **Sealed—oversize ball bearings on spindle and shaft**
- **Sealed unit construction *permits mounting in any position***
- **Mounting surfaces on three sides for installation flexibility**

Find out now—why Holomatic drill units are setting the pace in progressive production plants across the nation. Your Hause representative will gladly demonstrate their multiple dollar-saving efficiencies right in your plant.

Write today *... for demonstration or additional information, specifications and prices on the new Holomatic "Air-Hydraulic" Drill units, "Balanced Air" Threading units, "Lead Screw" Tapping units, complete machines or full line of machine bases and accessories.*

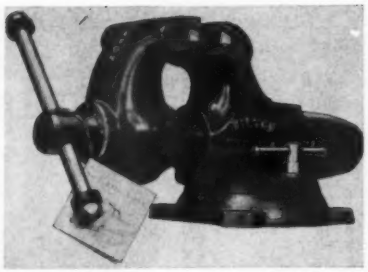
Hause MACHINES, INC.
MONTPELIER, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1453

Product News

Strong Machinist Vises

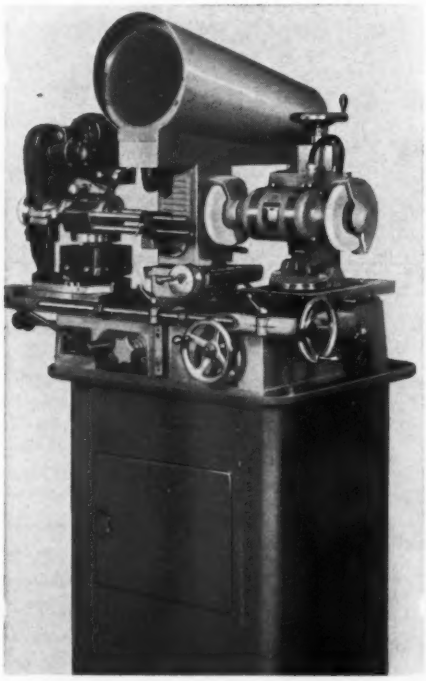
A new series of Machinist vises are 50% stronger and heavier in major stress points, including handle and swivel locking slide bar. Eight sizes, with 2½" to 8" jaw widths, maximum openings from 3" to 12", and throat depth range from 2" to 5½", are available. Get details from Wilton Tool Mfg. Co., Inc., Schiller Park, Ill., or Circle Inform-A-Gram No. P34.



SEE THE
R-O
IN OPERATION

A.S.T.M.E.
SHOW
APRIL 21-28
DETROIT

BOOTH 560



SEE THE NEW R-O SWING-IN COMPARATOR!

There is always a crowd at the R-O booth because metalworking men are always looking for ways to do things better. Here's a tool that produces form relief on cutters, adding to their life and cutting ability—that does a dozen and one jobs in the tool room faster and easier than they've ever been done before. It's in use on thousands of jobs across this country and in 14 foreign countries.

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UNIVERSAL
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FIXTURE

R-O Grinder

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31171 Stephenson Highway, Madison Heights, Mich.
Please forward the R-O catalog

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Title .....

CIRCLE INFORM-A-GRAM KEY NO. 146

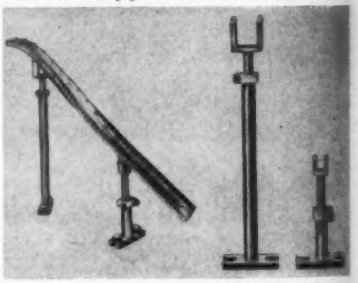
Automation Tool Series

Efficiency and economy of air motors and air cylinders are combined in the new 21K and 21L series automation tools introduced by Buckeye Tools Corp., 5003 Springboro Pike, Dayton 1, Ohio. They're for drilling, tapping, fastening, grinding, reaming, counterboring, and wire brushing. Both rotary motion and linear motion are provided. Contact the company, or Circle Inform-A-Gram No. P35.

New Concentricity Gage

This new Centric concentricity gage measures to 0.001"tir1" from spindle, or to 0.0005" with selected collets. For internal holding, 0.0005" tir can be measured. It's used for light cylindrical grinding on surface grinders or mounted on comparator for concentricity measurements. For details, write The Dunham Tool Co., Inc., New Fairfield, Conn., or Circle No. P36.

Chute Supporters



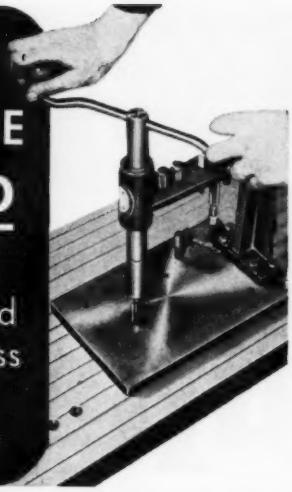
Standard prefabricated chute support columns and yokes are now available from Syntron Co., 341 Lexington Ave., Homer City, Pa. They're used to support the gravity feed chutes between parts feeders and processing machinery. Write for a catalog from the company, or Circle Inform-A-Gram No. P37.

Dahlstrom TAP GUIDE

$89.50

F. O. B. Factory

Taps By Hand with Drill Press EASE and ACCURACY



Just spot the hole and turn the handle for fast, easy custom tapping. A ruggedly built Dahlstrom Tap Guide taps straight every time—reduces tap breakage. Saves time lost digging out broken taps. Fastens to bench or carries to job . . . Taps big jobs through base . . . Spindle can tap on lathe or be a tap extension. Comes with 9 adaptors 8-32 to ¾" (taps not furnished) . . . 7½" throat . . . 8" x 11¼" table . . . wt. 32 lbs. *ORDER NOW—SAVE TAPS and TIME!*

Ask for bulletin on the Dahlstrom line of bench tools.

Branch MANUFACTURING COMPANY

16 Olson Drive, North Branch, Minn.

CIRCLE INFORM-A-GRAM KEY NO. 1471

IMMEDIATE DELIVERY ON

SOFT BLANK TOP JAWS

SAVE OVER 50%

Soft-Blank Top Jaws are made to American Standards and may be used on any chuck having master jaws that are made to these specifications.

Both Medium and Heavy Duty styles are carried in stock and are available for immediate delivery from 1020 steel.

WRITE TODAY for SPECIFICATIONS and PRICES

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HURON MACHINE PRODUCTS INC

P.O. BOX 2274 • DEARBORN, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1472

YOUR SPECIAL CUTTING TOOL PROBLEMS ARE SOLICITED.

You are welcome to our 25 years experience in designing and producing Special Cutting Tools.

Submit your problem—with sample part, if feasible OR we'll manufacture to your specifications.

Thousands of *Severance* SPECIAL CUTTERS shipped monthly!

ASK FOR A QUOTATION TODAY!

MIDGET MILLS

CHATTERLESS COUNTERSINKS

BALL SEAT REAMERS

CARBIDE END MILLS

CARBIDE HAND FILES

ELECTRODE DRESSING CUTTERS

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TUBE END DEBURRING CUTTERS

HAND DEBURRING CUTTERS

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Severance TOOL INDUSTRIES INC.

730 IOWA AVENUE

SAGINAW, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1473

Free Sample Tube

Industry's NEWEST Production TOOL

MOLYKOTE® G LUBRICANT

- ALMOST 100% SAFETY AGAINST GALLING AND SEIZING WITH ALL BEARING METAL COMBINATIONS
- ELIMINATES STICK-SLIP, METAL PICK-UP AND DISTORTION IN PRESS FITTING
- REDUCES WEAR-IN TIME AND DAMAGE IN NEW OR REBUILT MACHINERY
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Write for your free sample of MOLYKOTE G LUBRICANT today. We will also send you a copy of our new Bulletin 126 which gives complete details. THE ALPHA MOLYKOTE CORPORATION, 65 Harvard Avenue, Stamford, Conn. Phone Fireside 8-3724. Plants in Stamford, Conn., Munich, Germany and Strasbourg, France.

THE ALPHA-MOLYKOTE CORP.
65 Harvard Ave., Stamford, Conn.
Please send me a free sample of your MOLYKOTE G Lubricant.

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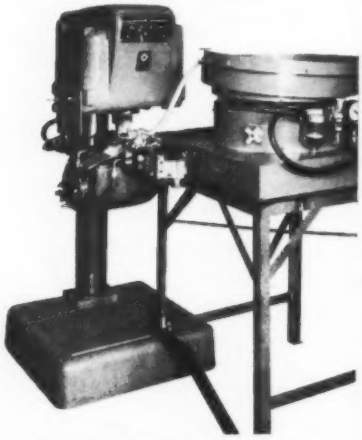
CIRCLE INFORM-A-GRAM KEY NO. 1474

HIGH SPEED *Markers*

Model 2601 marks round shapes as fast as they can be fed. Rotating table delivers parts to marking die — uses roll action for precision marking at minimum pressures.

Model 2620 illustrated with hopper feed for continuous automatic operation. Suitable for tubular or solid rounds.

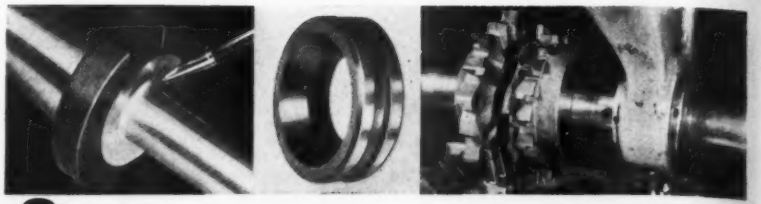


We have illustrations of many hundreds of special marking applications.

Write for further information stating your requirements.

JAS. H. MATTHEWS & CO.
3962 FORBES AVENUE
PITTSBURGH 13, PA.

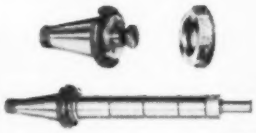
CIRCLE INFORM-A-GRAM KEY NO. 1481



improve setup accuracy, cutter life

...with Scully-Jones milling arbors— large end bearing and oversized end collar give you a perfect fit and added protection against runout when spacers and cutters are "snubbed up." New 45° chamfer in end collar leaves plenty of clearance over the fillet. Larger size makes it easy for operator to identify end collar—prevents mistakes when setting up. More accurate setups mean each tooth in the cutter takes its share of the load. Larger 3/16" radius between arbor body and shaft eliminates stress points, reduces possibility of breakage under heavy loads. S-J shell end mill arbors increase accuracy, too, because taper is held within .0002", with 10-20 microinch finish. Call your Scully-Jones representative or distributor for service on arbors, solid and adjustable spacing collars, shell end mill arbors, and precision sleeves. Look in the Yellow Pages, or phone us—BIshop 7-5900.

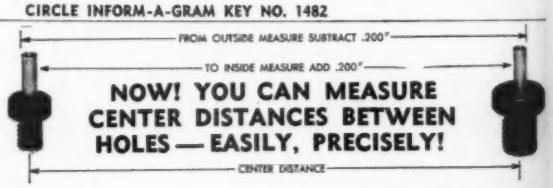
Scully-Jones and Company
1913 S. Rockwell, Chicago 8, Ill. • Ph. BIshop 7-5900



SCULLY JONES MILLING ARBORS

CIRCLE INFORM-A-GRAM KEY NO. 1482

FAST BECOMING A NEW AMERICAN STANDARD



NOW! YOU CAN MEASURE CENTER DISTANCES BETWEEN HOLES — EASILY, PRECISELY!

JO-PLUGS

Sizes No. 0-80 to one inch

JO-PLUG USER INSPECTION REPORT

Saving of 80% on inspection time with positive accuracy on part shown.

SATISFACTION GUARANTEED

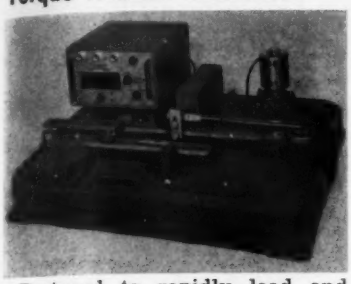
Send for Free Catalog Now!

Spence Industries 6910 CHASE ROAD, DEARBORN, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1483

Product News

Torque-Wrench Calibrator



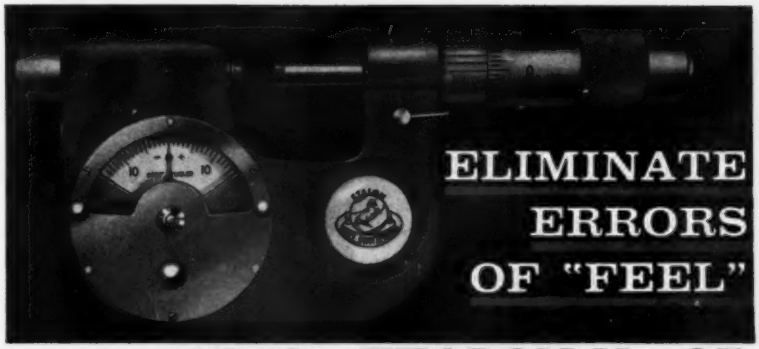
Designed to rapidly load and read out the actual break-away value of torque wrenches, Model TWC-139 torque wrench calibrator was developed by Steel City Testing Machines, Inc., 8817 Lyndon Ave., Detroit 38. It calibrates torque wrenches with capacities from 20 in-lbs to 2000 ft-lbs. Get details from the company, or Circle Inform-A-Gram No. P38.

Diamond Pins

Ideally suited for jig grinding, internal grinding of small holes, and many other precision operations is a new line of diamond pins. Close tolerances can be achieved at production rates in hardened steel, ceramics, and carbides. Get data from Titan Tool Supply Co., Inc., 1419 Hertel Ave., Buffalo 16, N.Y., or Circle No. P39.

New Tool Bits

DoAlloy tool bits, made of a cast alloy cutting tool material, fill the gap between the maximum speed possible with high-speed steel and the minimum speed practical with carbides. They're recommended for general purpose work on ferrous and non-ferrous materials and are particularly advantageous at high speeds and heavy loads where considerable heat is generated. For details, write The DoAll Co., Des Plaines, Ill., or Circle No. P40.



with the ETALON No. 25

The micrometer that measures and compares visually!

A rugged instrument designed to combine the precision of a dial indicator with the accuracy of the micrometer screw.

- **Range 0 to 1".**
- **Dial graduated in .0001" or .00005".**
- **Adjustable anvil pressure.**
- **To simplify fine adjustment, the dial can be rotated so that the "0" may always be placed under the hand.**
- **Built-in tolerance hands, individually adjustable: red for undersize, blue for oversize.**
- **Tungsten carbide measuring faces.**
- **One piece hardened stainless steel screw.**
- **Retractable anvil.**
- **Jewelled and shock proof.**
- **Also available as No. 25 SD with .080" diameter measuring faces and as No. 25 SR with an extra long anvil.**

WRITE FOR ILLUSTRATED LITERATURE

ALINA CORPORATION

122 East Second Street, Mineola, Long Island, New York

CIRCLE INFORM-A-GRAM KEY NO. 1491

Ernie's the wonder boy since he's using our **ACME TAPS!**

Ernie's job with a large Cincinnati firm was like any other young machinist's—until we surprised his boss by delivering one tap instead of a set of two!

Their order: A set of rough and finish Acme taps to produce a 2⅛" diameter, 4 pitch, double left hand thread in a part made of Johnson bronze. Length of thread 7", with close concentricity between thread and major part.

Our long experience in producing Acme taps suggested that this job *might* be done with a *single-pass* tap. We experimented—and came up with a tap that amazed the whole shop.

Now, instead of the skilled mechanic needed for multiple stage taps, less experienced fellows like Ernie are producing the same parts in half the time. Better quality, too. And no broken finishing taps or loss of other parts.

With production costs down and high-priced personnel released for more productive assignments, this company now stands in a better competitive position.

We've been in this business for over 20 years and will be glad to help you, too. Send for our brochure.

- SHOP-TESTED (12 years)
- CUSTOMER ACCEPTED (4 years)

Available from factory stock! Single-pass Acme Taps from ⅜" to 2½" diameter.

H&R HORSPOOL & ROMINE 5850 Marshall Street Oakland 8, California

CIRCLE INFORM-A-GRAM KEY NO. 1492

Catalogs and other helpful literature

Metal Forming in three operations is described in a bulletin which explains the Multi-Flo-Reform process, gives steps in the operations, and examples. Write The Lodge & Shipley Co. for Bulletin F326, or Circle Inform-A-Gram No. C1.

"Aids to Better Coiling" is a 16 page manual that describes basic factors and variables involved in forming nickel-chromium resistance wire into helically coiled electric heating elements. Get a copy from Hoskins Mfg. Co., or Circle Inform-A-Gram No. C2.

A Press Brake bulletin shows 90- to 1500-ton models and describes design features, special work area provisions, typical forming and bending dies, and tables for computing bending, punching, and blanking tonnages. Get bulletin 89E from Niagara Machine & Tool Works, or Circle No. C3.

Store Tools and Accessories used with jig grinders and jig borers in a new cabinet-bench, introduced in a bulletin that shows how the various items can be arranged. Write Vidmar, Inc., for a copy, or Circle No. C4.

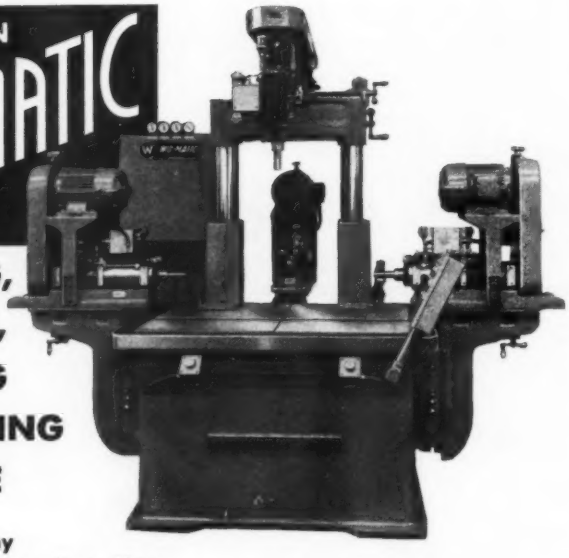
An Air & Hydraulic Components catalog gives specifications and applications for a number of different cylinders and valves. Write Modernair Corp. for your copy, or Circle Inform-A-Gram No. C5.

"A Study of Temperature Uniformity in Heat Treating" discusses temperature uniformity as related to furnace design and controlled forced convection heating. Graphs show test results under three conditions. Contact Ipsen Industries, Inc., for your copy, or Circle No. C6.

A Collet, Pusher, and Cam catalog has 22 pages of illustrations and specification charts. Possibilities for re-conditioning cams are also included. Write Modern Collet and Machine Co. for Catalog 59, or Circle Inform-A-Gram No. C7.

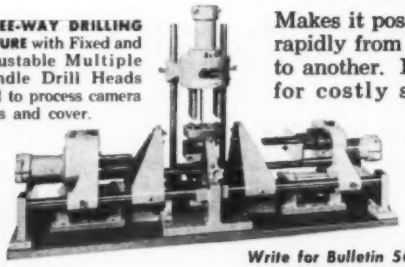
"Stainless Steel Tubing" has 34 pages of details on various sizes and grades, design data, and uses. Get your copy from Allegheny Ludlum Steel Corp., or Circle Inform-A-Gram No. C8.

WISCONSIN
WIS-MATIC
DRILLING, TAPPING, REAMING and BORING MACHINE



Available in any combination of One, Two, Three or Four Horizontal and One Vertical Power Unit

WITH PACKAGE TOOLING



THREE-WAY DRILLING FIXTURE with Fixed and Adjustable Multiple Spindle Drill Heads used to process camera cases and cover.

Makes it possible to change over rapidly from processing one part to another. Eliminates the need for costly special machines. Makes it readily adaptable to a wide variety of production jobs.

Write for Bulletin 560 or visit Booth No. 621 at ASTME Tool Show, Detroit, April 21-28.

WISCONSIN DRILL HEAD CO.
4975 NORTH 124TH STREET • BUTLER, WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 150

PUSH BUTTON *Speed Selection*

from **to** **in seconds**

or to *any* intermediate speed, *instantly*

Just push a button and watch the large tachometer dial on the headstock!

It's that easy!

The work is done by a motor driven speed changer. It accelerates or slows the lathe to any desired speed in seconds. With a 10:1 ratio, this new variable drive makes it easy to select from a wide range of speeds—200 to 2000 rpm in direct drive and 40 to 300 rpm in back gear.

Maximum stability and smooth power transmission are assured because the drive unit is oversized. All pulleys and shafts are fully supported (eight bearings). Double V-belts throughout the drive eliminate slippage and deliver full power to the spindle. Because of this rigidity and extra pulling power, this lathe will take heavy cuts at all speeds and precision finish cuts at high speeds.

It is a precision lathe, moderate in price, with the versatility for toolroom, production or second operation jobs.

SHELDON *Variable Speed* PRECISION LATHES

Illustrated WM56P 13" Swing- 34" Centers Base Price F.O.B. Factory

Write for

"Variable Speed" Circular and General Catalog showing . . .

- 10", 11", 13" and 15" SHELDON Precision Lathes (Bench, Pedestal and Cabinet types)
- 13" and 15" SEBASTIAN Geared Head Lathes
- SHELDON Milling Machines
- SHELDON Back Geared Shapers

SHELDON MACHINE CO., INC.

4235 N. Knox Avenue. • Chicago 41, Illinois

See us at ASTE Show, Detroit, April 21-28, Booth 1727

CIRCLE INFORM-A-GRAM KEY NO. 1511

the ARC-TWIN *Cuts Two Perfect Notches* in *One* Downstroke of Press!

SAVING both time and cost, it gives you perfect T-joints — instantly ready for welding or brazing without deformation or finishing! Twin-acting punch shears clean, from inside out, leaving two matching notches (in perfect 180° alignment) with every downstroke of the punch press. Quickly interchangeable dies and punches accommodate pipe and tubing from ½" to 2½" O.D.; special units, up to 3" O.D.

Special Arc-Twins for double notching stainless steel or monel metal and units built to your specifications can also be furnished.

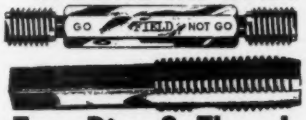
PATENTED

Ask for twin-notched sample of pipe or tubing

VOGEL TOOL AND DIE CORPORATION 1813 N. 32nd Avenue Stone Park, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1512

WHY WAIT! Immediate Delivery From THE LARGEST STOCK OF SPECIAL RH & LH



Taps-Dies & Thread Plug Gages

Also in Stock:

- RING GAGES
- ACME & METRIC TAPS & DIES
- SPECIAL REAMERS
- EX. LONG DRILLS

Write for WALL CHART Listing Sizes

Special Taps Also Made to Your Print Specifications

* Quotations on Request *

FIELD TOOL SUPPLY CO.

Industrial Cutting Tools

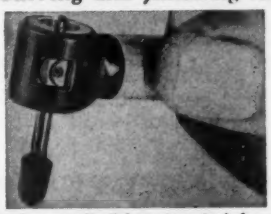
31 S. DESPLAINES ST., CHICAGO 6, ILL.

All Phones: Financial 6-1195

CIRCLE INFORM-A-GRAM KEY NO. 1513

Airburr

miniature high speed deburring and finishing tool



Here is a small, light rotary tool for deburring and light grinding in tight places. Speeds from 30,000 to 150,000 rpm allow small wheels and burrs to operate at correct surface speeds. Operates on air pressures from 10 to 100 lb/sq. in. with low air consumption.

If your dealer cannot supply you write us for further information.

ELLISON ENGINEERING CO.

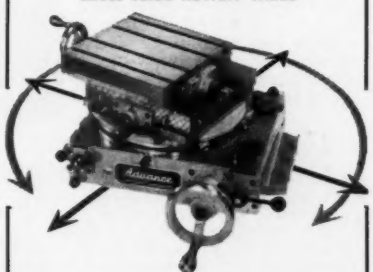
4530 San Fernando Road

Glendale 4, California

CIRCLE INFORM-A-GRAM KEY NO. 1514

Advance.

CROSS SLIDE ROTARY TABLE



FAST, PRECISE milling of dies and molds by eliminating conventional rotary table "set-ups." Hundreds in die, mold, and tool shops.

ADVANCE PRODUCTS CORP.

Benton Harbor, Michigan

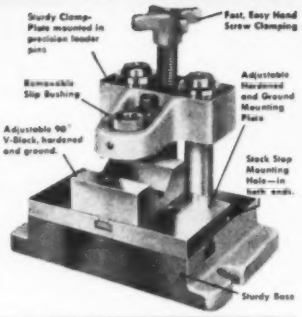
CIRCLE INFORM-A-GRAM KEY NO. 1515

REPCO Time-Saving Tools

ADJUSTABLE V-BLOCK DRILL JIG

Saves Set-Up Time—Increases Output

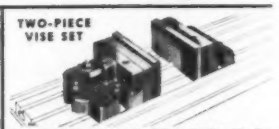
Here is a versatile and accurate V-Block that makes center and off-center drilling, tapping, and reaming easy and precise. Four-way V-block adjustment simplifies handling a wide range of work. Fast, easy positioning and clamping speed production. A centering locator plug and T-slots in the mounting surface plates assure fast, easy, on-center adjustment. Drill capacity #80 to ⅛" diameter. Handles stock from ¼" to 2" diameter.


Sturdy Clamp-Plate mounted in precision loader pins
Fast, Easy Hand Screw Clamping
Removable Slip Bushing
Adjustable Hardened and Ground Mounting Plate
Adjustable 90° V-Block, hardened and ground.
Stock Stop Mounting Hole—in both ends.
Sturdy Base

TRUE-CENTER ADJUSTABLE TOOL HOLDER

The REPCO Adjustable Holder is a precision-built tool, having two-piece construction which provides fast adjustment of the main body to compensate for as much as ⅛" machine misalignment. Cuts down on tool wear, breakage, and scrap.

TWO-PIECE VISE SET

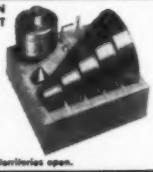


Save time with this versatile 2-Piece Machine Vise Set. Use as general-purpose vise, angle-block, or separate clamping device. Opening limited only to length of machine base. Light, accurate, rigid. Two sizes: 6" and 8".

CHUCK JAW TRUING-RING SET

This Ring Set saves time, cuts cost of boring jaws. With correct diameter rings at hand, you gain hours of productive time. Plated rings range from 1" to 4" by ⅛" increments. Handy peg-type rack keeps rings in place.

COMBINATION LIVE-CENTER SET



Heavy-duty live center plus six interchangeable adapters, ranging from a point to 6⅛" dia. ball. Saves costly set-up and machining time necessary to make large-diameter centers. Straight and various taper shanks available.

Write for complete information—Exclusive agent territories open.

REPCO ROCKFORD ENGINEERED PRODUCTS CO.

2322 —23rd Avenue • Rockford, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1521

FOR FASTER GRINDING at LOWER COST

USE A.I.T. Diamond Wheels for all Carbide Grinding

RESIN **B-60** Cup Type Diamond Wheel

The exclusive B-60 Bond used in A.I.T. bonded diamond wheels has been field tested in over 400 plants. We can *prove* these superior advantages to you in YOUR plant:

- Faster grinding
- Up to 40% longer wheel life
- One grit size wheel can be used to hog and finish—for extra savings.
- Wheel grinds cooler—does not fracture carbide
- Corners stay sharper longer
- No re-dressing of diamond surface
- NEW BACKING dissipates heat faster
- No down-time for dressing inside body section

Write today for new, FREE catalog and prices

A.I.T. Diamond Tool Co.

8217 N. KIMBALL AVE.
SKOKIE, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1522

WRITE NOW FOR THIS **FREE CATALOG** ON WORK HOLDING TOOLS FOR PRODUCTION, TOOLING, MAINTENANCE

Drill press vises, angle vises, swivel machine vises, rotary tables, lathe milling attachments, production vises, heavy duty angle vises, and adjustable angle plates are illustrated and fully described in the New Palmgren Catalog. This is the only complete line of work holding devices available anywhere. Designed for production, tooling, and maintenance work, there are 68 different models and types to choose from. Vise jaw sizes are from 1½" to 8". Ask for your copy of this FREE Catalog No. 205 today. The complete line with details and prices are shown.

PALMGREN PRODUCTS by CHICAGO TOOL AND ENGINEERING CO.
8388 SOUTH CHICAGO AVE. • CHICAGO 17, ILL.

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Proven BEST!

Mistic Mist mist coolant **GENERATORS**

More than 28,000 in daily use!

500% increase in tool life! Mistic Mist cools the tool and **not** the chips! Heat is absorbed by the rapid expansion of compressed air and evaporation of fine mist which produces maximum cooling results.

200% greater production! Tools stay cooler . . . cut cleaner . . . at greater speeds. Better finishes, too! Small diameter nozzle delivers cooling mist closer to the cutting action. No mess . . . no drip or splash pans needed.

Available in one, two or five gallon units with single or multiple outlets . . . or central systems for complete shop installations. Have it demonstrated in your shop without obligation. Your Dealer's name and literature will be sent on request.

AETNA MANUFACTURING CO.
185 S. York Rd.
Bensenville, Ill. • POrter 6-3810

CIRCLE INFORM-A-GRAM KEY NO. 1524

Catalogs . .

Reciprocating Tool Grinders are featured in a new booklet that describes models for conventional and electrolytic grinding. Bulletin 465927 is available from Ex-Cell-O Corp., or Circle No. C9.

An Extruded Aluminum Bronze Wear-Strip, Wearite, is described in a new brochure which discusses applications and characteristics of this tough material. For a copy, write Meier Brass & Aluminum Co., or Circle Inform-A-Gram No. C10.

"Metal Sawing Machines" features a number of different saws for a variety of jobs. Specifications, features, and applications are described. Get Bulletin 7000 from Peerless Machine Co., or Circle Inform-A-Gram No. C11.

A New Norman Reflection Unit for FC-14 and TC-14 models of the J&L optical comparator is described in a bulletin which explains how the unit works, its features and specifications. Write Jones & Lamson Machine Co., for a copy, or Circle Inform-A-Gram No. C12.

A Complete Drill Bushing Price List contains information on different types of drill bushings and includes a quantity discount chart. Get a copy from American Drill Bushing Co., or Circle No. C13.

A Numerically Controlled Machine guide book answers some questions about operation and approximate costs of tape controlled operations. Get the 20-page booklet from Ex-Cell-O Corp., or Circle Inform-A-Gram No. C14.

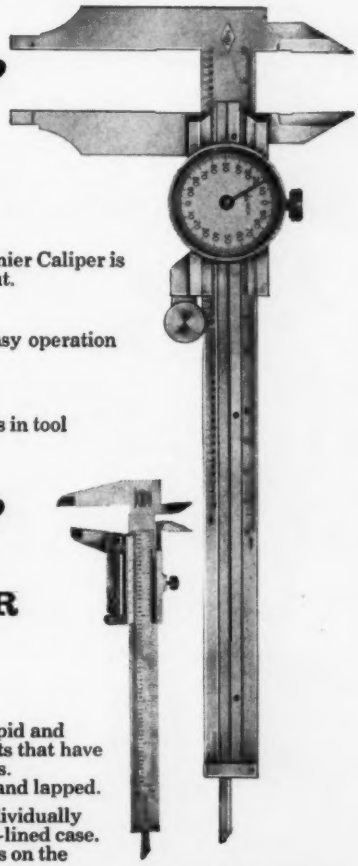
"Profitivity Lease Plan" a new bulletin, describes a plan that allows manufacturers to have needed machine tools without capital outlay or other burdens of ownership. Get a copy from Jones & Lamson Machine Co., or Circle Inform-A-Gram No. C15.

Over 70 Vises—including angle vises, milling machine and production vises, and air vises—adjustable angle plates, cross slide milling tables, rotary tables, and indexing tables are presented in Palgren Catalog P100 from Chicago Tool & Engineering Co., or Circle Inform-A-Gram No. C16.

A Surface Measurement bulletin describes the Profilometer's practical features and applications. Profilometer combinations that can handle measurement of many surface finish problems are shown. Contact Micrometrical Mfg. Co., for your copy, or Circle Inform-A-Gram No. C17.

Eliminate costly reading errors with the

"HELIOS"
DIAL VERNIER CALIPER with built-in DIAL INDICATOR
Direct Reading in .001"



The world famous "HELIOS" Dial Vernier Caliper is hardened, ground and lapped throughout.

Other features:

- Thumb roll permits quick and easy operation
- Knurled lock screw
- 100% measuring capacity (outside, inside and depth.)

Available in 5", 6", 8" and 10" capacities in tool steel or stainless steel.

Height Gage Attachment optional.

"HELIOS"
SWING-JAW VERNIER CALIPER
with knurled lock screw

- Direct Reading
- Capacity 4¾"
- Length of Jaw 1⅝"

The swinging jaw allows a very easy, rapid and extremely accurate measurement of parts that have faces which do not lie along the same axis.
This caliper is stainless steel, hardened and lapped.

Every "HELIOS" Vernier Caliper is individually packaged in a beautiful hardwood velvet-lined case. Write for detailed information and prices on the "HELIOS" Caliper line.

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M. B. I. EXPORT & IMPORT LTD.
A DIVISION OF MACHINERY BUILDERS, INC.
475 Grand Concourse, Bronx 51, N. Y.
"Over 25 years' experience in designing and building machinery."

CIRCLE INFORM-A-GRAM KEY NO. 153

Catalogs . .

A New Welding Cable Connector with a patented locking action is described in a brochure that shows the offset design and points out advantages. Ask for Bulletin W-32 from Ampco Metal, Inc., or Circle Inform-A-Gram No. C18.

A Super Precision Grinding Spindle bulletin contains specifications, photos, and other details on new spindles featuring the new Nilos rings that seal out dirt, abrasives, and coolants. Get Bulletin DM59 from The Dumore Co., or Circle Inform-A-Gram No. C19.

A 50-Page Handbook on Sheffield Precisionaire gaging tells how to select the right amplification, when to use long-range air gages, and principles of air gaging ID's, OD's and other geometrical conditions. Write The Sheffield Corp. for Catalog SPG-180, or Circle Inform-A-Gram No. C20.

AUTOMATION = Rotation (Spindles) by STANDARD
BUILDING BLOCK = Movements (Feeds-Swivels)
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. . . just a few of the SLIDES-FEEDS-SWIVELS or Combinations thereof as offered in STANDARD's New Catalog No. 22 . . . ask for your Copy.
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MOUNT VERTICALLY or HORIZONTALLY
AVAILABLE ON ANY FEED: Power Cylinders (Figs. 6, 10 and 11); Accordion Protectors (Figs. 5, 7 and 8); Right Angle Feeds (Figs. 8 and 9); 360° Swivel Work Base (Fig. 5); 360° Mounting Base (Figs. 8, 9, 11, 12 and 13).
Use SLIDES-FEEDS-SWIVELS for SPINDLES-WORK-FIXTURES ALIGNMENT INSTRUMENTS
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"BUILDING-BLOCK" ASSEMBLIES with STANDARD Feeds and Swivels and STANDARD Super Precision Spindles
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PRECISION SPINDLE AND MACHINE TOOL DIVISION
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CIRCLE INFORM-A-GRAM KEY NO. 154

Compressed Air Products, including filters, regulators, lubricators, and accessories, are completely described and illustrated in a 22-page booklet. Model comparisons and features are also discussed in Catalog 158 from Wilkerson Corp., or Circle Inform-A-Gram No. C21.

A New Dowel Pin assortment kit is described in a new bulletin. The kit contains 10 each of the 16 most often used dowel pin sizes. Write The Producto Machine Co. for a copy, or Circle No. C22.

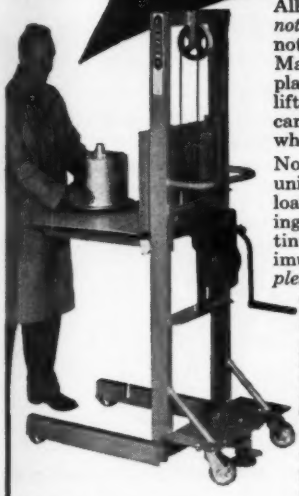
A New Aluminum Bronze Alloy that resists stress-corrosion cracking is introduced in the latest issue of the Ampco Welding News. Request a copy from Ampco Metal, Inc., or Circle No. C23.

Time Saving Production, inspection, and toolroom tools are illustrated and described in a new catalog. Illustrated uses of the multi-purpose work holder, three models of hand tappers and accessories, and a universal tap and die guide are included in Catalog 1960 from Lassy Tool Co., or Circle No. C24.

ALL NEW

MARK II
Shoplifter

New Low Price $195.00 *
New Capacity Full 750 lbs.



All lifters at this price *are not* the same. Compare and note the quality of the new Mark II, which now replaces the Type D Shoplifter. Full 750 lb. capacity can be handled safely anywhere on the platform.

No-drift, full control hoist unit. Raise or lower the load to fractional positioning. Built for years of continuous service with minimum maintenance. *Complete* safety features included at no extra cost.

Applicable in small plants for "too heavy to lift loads" and in large plants to supplement powered equipment. The economical way to transfer molds and dies, unload trucks, stack in narrow aisles, or raise parts and machinery to working levels.

Write for specifications and other details.

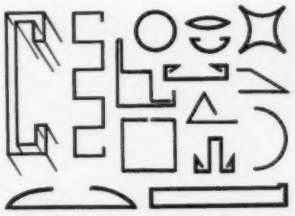
*Priced f.o.b. Chicago

ECONOMY ENGINEERING
4509 W. Lake St., Chicago 24, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 1551

form-all

FORMS WITHOUT DIES...



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and others

Dealer inquiries invited

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BUFFALO, NY U.S.A.

SEE HOW IT WORKS!
ASTE Show • Detroit • April
BOOTH 910

CIRCLE INFORM-A-GRAM KEY NO. 1553

VALUABLE REFERENCE

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84-PAGE
CATALOG

One Complete Source of Detailed Specifications for Designers, Production Managers, Toolroom Foremen

Hundreds of NEW ITEMS

ALL NEW — Complete specifications and cost saving data on over 2000 "Standards", including world's largest line of workholding equipment, chuck jaw blanks, handles, knobs, wheels, strap clamp assemblies, forged items, plus hundreds of other jig and fixture components. Detailed specifications, engineering drawings. The one complete source for data on all the "standards" for tool, die, jig, and fixture design and application.

Write for your FREE copy today.

JERGENS TOOL SPECIALTY CO.
DEPT. TP-4, 712 E. 163rd ST., CLEVELAND 10, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1552

Hunter-Stanley
SMALL HOLE DRILLER

REAL FINGER TIP PRESSURE CONTROL...

FOR MILLS
DRILL PRESSES
JIG BORERS
LATHES

MODELS AVAILABLE WITH JACOBS OR ALBRECHT CHUCK

OPERATION IS SIMPLE!

Insert the Hunter-Stanley in the chuck and start your machine. Finger-hold the ball-bearing feed ring and feed the drill into the work as slowly and carefully as you wish. You can tell immediately when to ease up as your machine is now as sensitive as your finger-tips. Let go the feed ring and light spring pressure retracts the drill to starting of regular running position.

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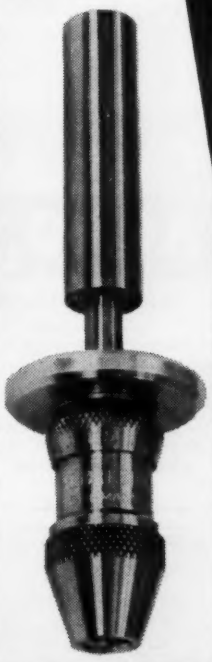

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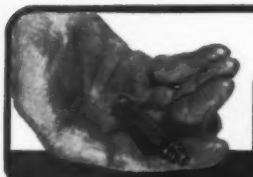

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IN 11 SIZES No. 6 to 1" N.C. In all S. A. E. sizes.

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench —no other tools needed. Get more work *now*—save money too!

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Here's the inexpensive, fast way of molding and remolding your own lead hammers with this COOK mold and ladle. It produces hammers that can "take it" Simple to operate.

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ELIMINATE WEAR ON YOUR COSTLY DIE SETS

WITH INEXPENSIVE

ACRO

LEADER PIN OILERS

Pin oilers in place on die set.

These simple, inexpensive pin oilers fit over each leader pin and seal in place with a rubber neoprene washer. Each cup is filled with oil so each downward stroke brings bushing in contact with oil and upward stroke distributes oil evenly over leader pins. You'll eliminate bushing wear, leader pin scoring, and maintain die accuracy with these oilers.

Order today. Prices shown are F.O.B. Milwaukee.

Pin dia. ⅞", 1" or 1⅛"	Pr. $ 6.50
Pin dia. 1¼", 1½" or 1¾"	Pr. 8.00
Pin dia. 2"	Pr. 10.00
Pin dia. 2½"	Pr. 12.00
Pin dia. 3"	Pr. 14.00

FREE FACTS covering four more money saving accessories for your plant are included in this new folder. Write today. Ask for bulletin TP59.

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NEW Centerlock Nut saves production time...speeds application

Here is a new low cost lock nut that can be applied from either end, double chamfered, with the locking feature in the center. The greater speed in application of these Centerlock Nuts can make definite savings in production time and provide low cost fastening. Ideal for customer assembled products.

The New Centerlock...

- Can be automatically fed
- Will lock wherever turned on bolt
- Does not depend on friction against work for locking
- Can be applied from either end
- Will not damage bolt threads
- Available in steel, Brass, aluminum or stainless on special order
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- Also in closed and open end acorn type
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119

Write for samples and NEW CATALOG today

GRIP NUT COMPANY

107 Maple Ave. South Whitley, Indiana

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The Inform-A-Gram card which follows page 106 is for your convenience in making inquiries about advertised Product and Editorial items.

Unconditionally Guaranteed!

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INSTA Hold-Down CLAMPS

"Clamps Without Shims"

Holds work securely on: Jig Borers • Planers • Punch Presses • Drill Presses • Mills • etc.

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Insta clamp 2420 Home Place Dearborn 8, Mich.

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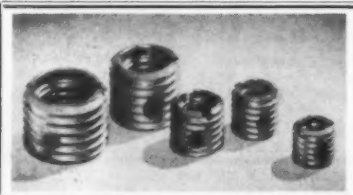

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- Self-locking, threaded inserts.
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- Use in aluminum, magnesium, plastic or cast-iron.

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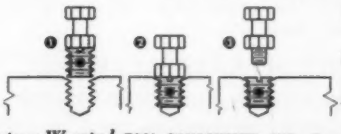

1. Drill, countersink (90° to 100°).
2. Tap National coarse thread.
3. Install with bolt or screwdriver.

Distributors Wanted TOOL COMPONENTS, INC. Box 1036, Gardena, California

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Catalogs . .

A New 24-Page Multipress bulletin describes actual applications, operational features, and specifications. Write Denison Engineering Div'n, American Brake Shoe Co., for Bulletin 120, or Circle Inform-A-Gram No. C25.

A Complete Engineering Technical Standard covering the new 1960 Series socket head cap screw is especially designed for engineers because it's readily reproduced on conventional blueprint machines. Get your copy from The Holo-Krome Screw Corp., or Circle Inform-A-Gram No. C26.

An Optical Bench Catalog has 28-pages describing the complete line of Gaertner optical and instrument benches including lathe bed, double rod, single rod types. Request Bulletin 156-59 from Gaertner Scientific Corp., or Circle Inform-A-Gram No. C27.

"Thread Gaging," an 18-page guide, includes recommended gaging procedures in addition to descriptions of Johnson precision thread comparators and gages. Write The Johnson Gage Co., for a copy, or Circle No. C28.

A New Roller Burnishing Tool, that gives from 125 to 5 micro-inch surface finish in one 5-sec pass, is completely described in a bulletin. Specifications, features, and details on how the tool works are included. Madison-Faessler Tool Co., supplies copies, or Circle Inform-A-Gram No. C29.

A 36-Page Saw Blade handbook and catalog presents guides for getting maximum cutting performance and blade life and shows how to select proper blade, correct feed, speed, and tension. Bulletin 578 from Ladish Co., gives details, or Circle Inform-A-Gram No. C30.

Two Small Precision Boring Machines, a single-end and a double-end model, are described and illustrated in a new folder. They're ideal for boring small holes at close center distances. For details, get Bulletin 315925 from Ex-Cell-O Corp., or Circle Inform-A-Gram No. C31.

For All Metal Shearing Applications, use the line of shear knives detailed in a brochure. Knives for cold and hot work and scrap service are included. Request catalog from American Shear Knife Co., or Circle Inform-A-Gram No. C32.

Induction Heating Equipment for automated metal heating is explained in a new bulletin. Standard units and technical services such as problem analysis, research, design engineering, and manufacturing, are discussed. For bulletin, write Robotron Corp., or Circle Inform-A-Gram No. C33.

A New Gage Catalog and manual contains complete pricing data and specifications on standard and special plug and ring gages and thread and plain gages. Charts show tap recommendations for classes of threads and screw thread standards. Get a copy from Beloit Tool Corp., or Circle Inform-A-Gram No. C34.

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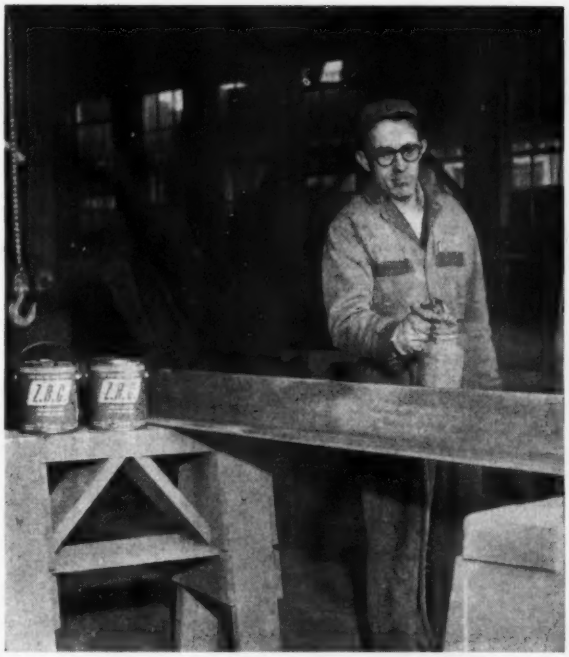

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Any Surface of any size anywhere

Easy to apply by brush, spray or dip!

Z.R.C. provides instant, long lasting galvanic protection for all iron and steel surfaces.

Z.R.C. is ready for use right from the container, requires no special surface preparation, mixing or blending, dries quickly (touch dry in 30 minutes) to form a tough, flexible, firmly adherent coating of 95% zinc. THIS COATING ALONE WILL WITHSTAND OVER 3000 HOURS OF SALT SPRAY TESTING AND PASSES THE PREECE TEST. It may be top coated if decorative painting is necessary. Cost, about 2¢ per sq. ft.

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WAKEFIELD, MASSACHUSETTS

CIRCLE INFORM-A-GRAM KEY NO. 157

CUMULATIVE EDITORIAL INDEX FOR 1960 ISSUES

TOOLING & PRODUCTION Magazine

The number of subjects in which T&P's editors present material in just a few issues adds up very rapidly. Most articles are of lasting interest and have future reference value in solving tooling and production problems.

This cumulative index will build up progressively during each calendar year. Each issue will carry a cumulative index of material contained in all previous issues of the same year, with each January issue carrying the complete index of the twelve issues of the previous year.

We suggest you see to it that your copies of T&P are retained for future reference so you can get the full benefit of this useful index.

The Publisher

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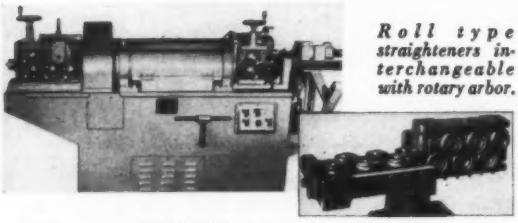
If you use wire up to 3/8"

. . . this new SHUSTER is just for you!



Roll type straighteners interchangeable with rotary arbor.

These new SHUSTER wire straightening and cutting machines incorporate new advantages to give you higher production — for less cost. The 2ABV variable speed unit straightens and cuts round wire from 3/16" to 3/8"; the 2ABVF straightens and cuts shape stock up to 1/4" square.

The new machines include an improved, vertical drive 5-roll gear driven preliminary straightening unit, and feed roll housing, both Timken bearing equipped. The new SHUSTERS can automatically cut lengths up to 14" at the rate of 140 pcs./min. and provide infinite variable speed within all feed and cutoff ranges. This machine may also be purchased as a constant speed unit (150 F.P.M.).

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1 set-up—
1 operation—
instead of 2!

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Dept. TP-4

BURR-BIT

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Even **holes** cost less in quantities... when you use

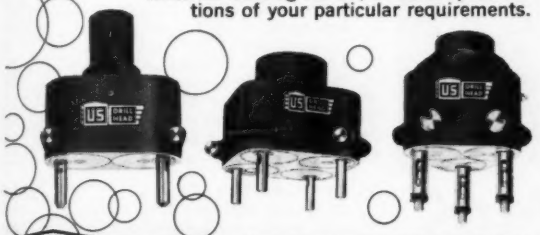
U.S. DRILL HEADS!

That's because these Standard Adjustable U.S. Heads are designed and built for profit-making performance . . .

Positive, all-gear drive . . . Shaved gears for smooth, quiet operation . . . High factor of safety in design . . . Anti-friction bearing mounting of shafts and spindles.

Ideally suited for high production with flexibility . . . drilling or tapping.

Write for Catalog AD-57, or send specifications of your particular requirements.



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Adjustable and Fixed Center Multiple Drilling Heads. Individual Lead Screw Multiple Tapping Heads.

UNITED STATES DRILL HEAD CO.

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E-X-P-A-N-D-I-N-G PLUG GAGE

solve a gaging problem for you?

The Comtorplug expansion principle is unique . . . and proven. Hundreds of U. S. precision-production programs use it, including several of the very largest. The unique expansion plug gives true 2-point gaging. You see actual diameter in a fixed reading to fraction of .0001". You measure front or back taper exactly, also ovality, bell mouth, etc. Centering, alignment and pressure are automatic, allowing accurate use by all types of personnel.

For holes ⅛" to 10" dia.

If you produce precision holes in volume

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COMTOR COMPANY, 69 Farwell St., Waltham 54, Mass.

COMTORPLUG

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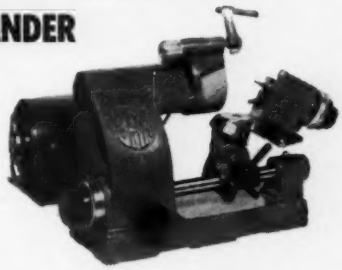
Accurate Cutter Sharpening With ALEXANDER Bench Grinders



Handles Extremely Small Radii

This Cutter Grinder provides precision forming of all single-lip cutters and tracing styles to any predetermined profile or cutting angle—on symmetrical or off-set radii. Work head is mounted on bar slide which permits coarse and fine longitudinal adjustments, and controlled oscillating movement. Two swivel bearings in work arm allow further vertical and horizontal adjustment. Collet attachment on index head accepts cutters up to ½" dia. Optional diamond wheel dressing attachment. Prompt delivery.

Write for catalog on ALEXANDER Cutter Grinders, Die Sinkers and Engraving Machines.

J. ARTHUR DEAKIN, INC.

31 ROSELAND AVE. CALDWELL, N. J.

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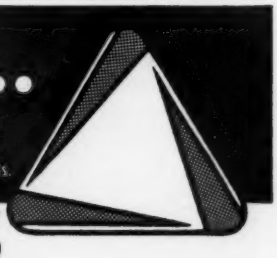
NOW...

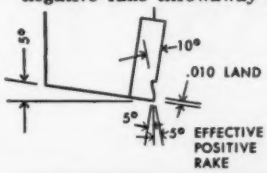
the efficiency of positive rake angles — with the economy of negative rake throwaway inserts.

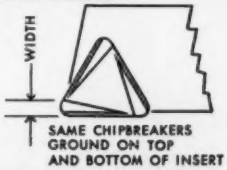


Save approximately 50%

ON THE COST OF POSITIVE RAKE CARBIDE INSERTS, YET GET THE ADVANTAGES OF POSITIVE RAKE ANGLE CUTTING.

Allied Tool Products will convert negative rake angles to the more effective positive rake angles by merely grinding-in positive rake chipbreakers into negative rake throwaway carbide inserts.





ALLIED-GROUND INSERTS GIVE YOU THESE ADVANTAGES:

- Positive rake chipbreakers are ground on both sides of negative rake carbide inserts, therefore utilizing all six cutting edges of triangular inserts . . . eight edges of square inserts.
- Approximately 50% savings over positive rake carbide inserts.
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- Positive chip control—eliminates need for easily lost chipbreaker plates.
- Reduces cutting pressures, horsepower and chatter — increases tool life.

Write today for complete facts on how Allied can save you carbide insert dollars.

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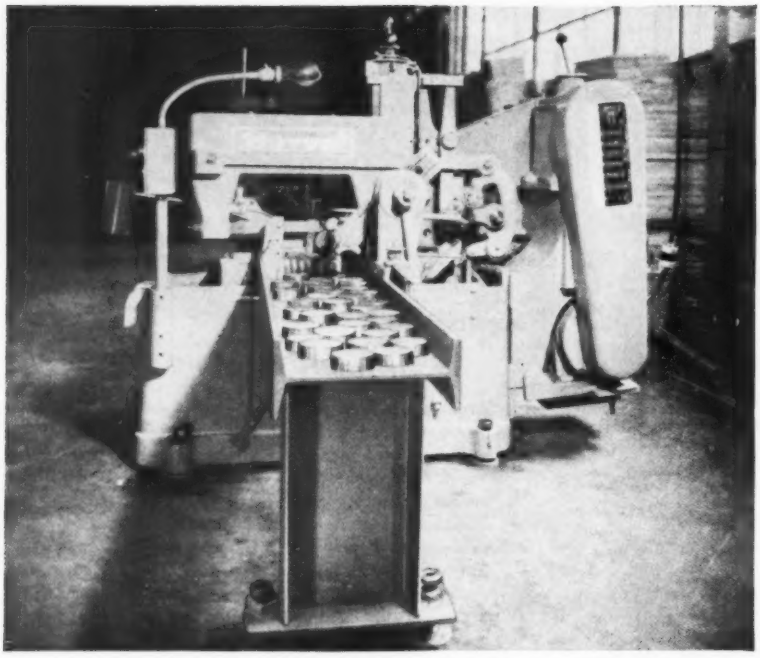

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A cut-off saw's value is proven at the discharge end of the machine. How quickly the trough is filled with accurately cut-off pieces can mean the difference between profit and loss on many jobs.

The R. J. Sudrick Co., Des Plaines, Illinois, manufacturers of precision aircraft components had to cut-off 4600 blanks from 3¼" round, 303 Stainless Steel Bars.

They bought our MARVEL No. 6A4 High Speed Heavy Duty Automatic Bar Feed Hack Saw Machine; used MARVEL High-Speed-Edge Hack Saw Blades, and got the high production, accuracy and economy they desired.

The point is this: MARVEL Metal Cutting Hack Saws equipped with MARVEL High-Speed-Edge Hack Saw Blades are an unbeatable combination for economical, accurate and safe cutting-off.

If your hack saws are not producing the economy you need to meet today's competition, try MARVEL High-Speed-Edge Blades. They will give you the competitive edge every time. Write for Catalog C-85 which has the complete story on MARVEL Hack Saws and Band Saws, Hack Saw Blades and Band Saw Blades.

PRODUCTION? Constant at 20 pieces per hour floor to floor

ACCURACY? Held well within the permissible tolerance of +.010 —.000

BLADE COST? Just 1½¢ per cut. Only twenty-three MARVEL blades were needed to make the 4600 cuts, and not a single blade failure due to blade breakage. MARVEL High-Speed-Edge Blades are unbreakable.

MMT-PE

ARMSTRONG-BLUM MFG. CO.

5700 W. BLOOMINGDALE AVE., CHICAGO 39, ILL.

Metal Cutting MARVEL SAWS

CIRCLE INFORM-A-GRAM KEY NO. 1601

C.I. HAND KNOBS

PRONG

SCALLOPED

Made in Prong and Scalloped as shown and in Long Shank with wrench hexagon.

REID TOOL ROOM ACCESSORIES, ... HIGH QUALITY LOW PRICES!

MALLEABLE MACHINE HANDLES

Made in straight and offset types as shown and in crank types. Withstands severe usage. Neat. Low cost.

STRAIGHT

OFFSET

FREE 88 Page Catalog

Lists 1800 tool room needs such as plastic and steel ball handles, compression and extension spring assortments, hand wheels, etc.

REID TOOL SUPPLY COMPANY

MUSKEGON HEIGHTS · MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1602

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with NEW G. A. S. UTILITY AIR HEATER

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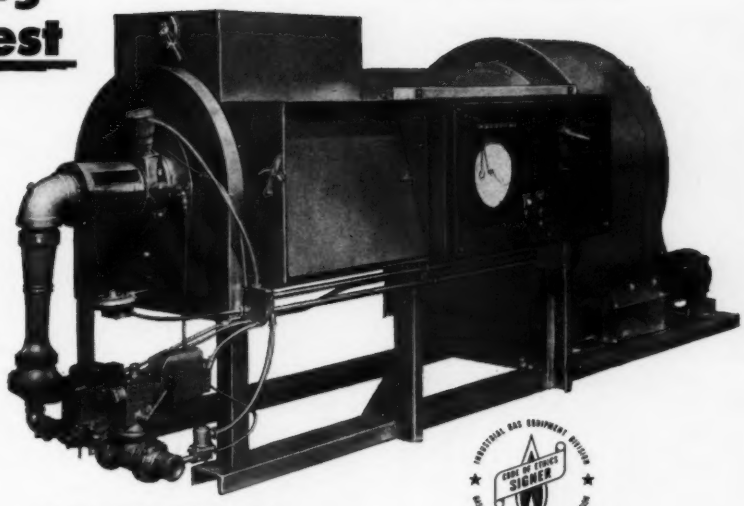

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Complete with controls.

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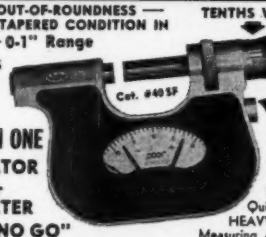

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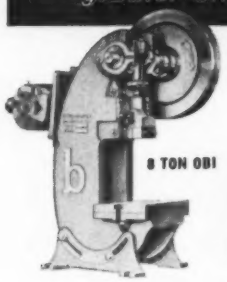

*Also available: 5 Ton Fixed Bed Gap Frame

8 TON OBI

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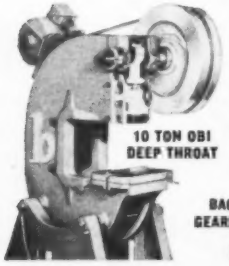
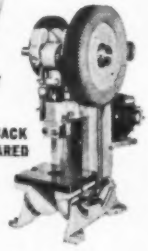


10 TON OBI DEEP THROAT



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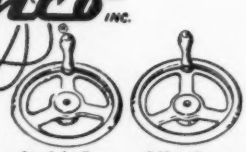

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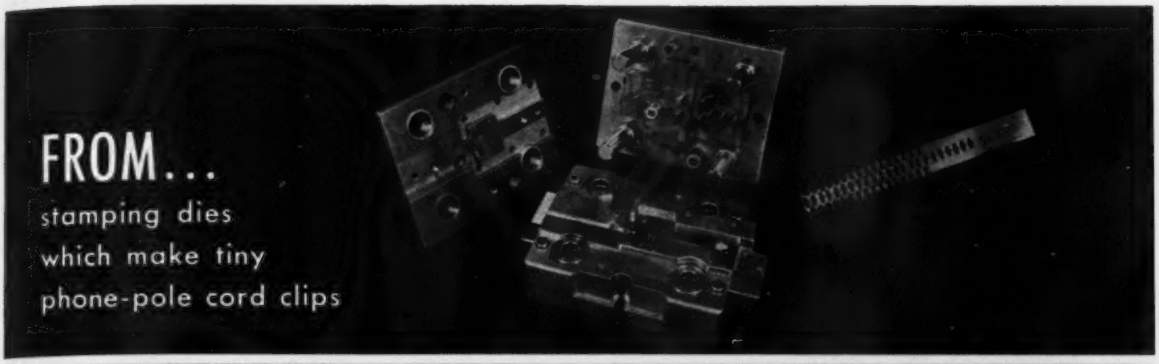

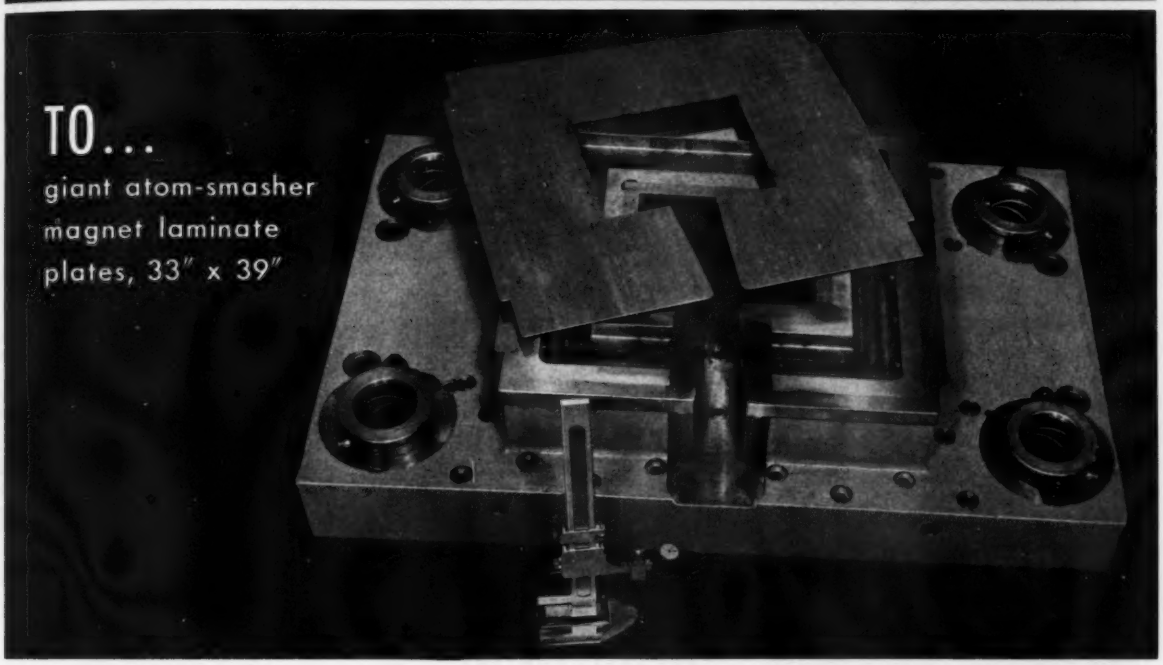

G-E Carboloy® cemented carbides on die cutting edges pay big bonuses

Looking for a better way to cut stamping and die-forming costs? A switch to General Electric Carboloy cemented carbide cutting edges in your dies can work wonders in turning out a better product at lower cost.

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Your die maker has interesting facts and figures on both long- and short-run economics through the use of G-E carbides in your dies. Call him or write: *Metallurgical Products Department, General Electric Company, 11111 E. 8 Mile Street, Detroit 32, Michigan.*

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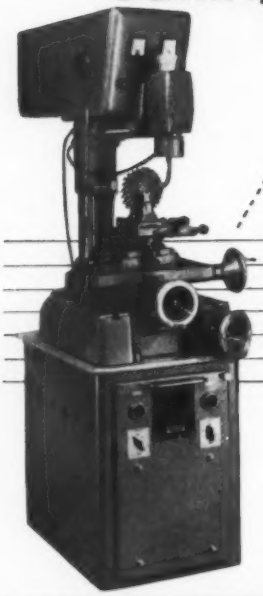
CARBOLOY CEMENTED CARBIDES

GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS • VACUUM-MELTED ALLOYS • THERMISTORS • MAGNETIC MATERIALS • THYRITE®

CIRCLE INFORM-A-GRAM KEY NO. 163

Like to increase your cutting tool life up to 400% ?



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CANADIAN REP.....B.S.A. TOOLS LTD., TORONTO

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Stops Losses making Dies and Templates

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THE DYKEM COMPANY

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- DIRECT READING TO .00005"
- FULL RANGE OF DIAL .004"
- DIAL GRADUATIONS 20-0-20

FULLY JEWELED & SHOCKPROOF MOVEMENT

LARGE VARIETY OF CONTACT TIPS AVAILABLE FROM STOCK

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ONLY $32.50

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- FINE ADJUSTMENT OF VERTICAL CAPACITY BY MEANS OF KNURLED RING WITH INSTANT LOCKING
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high speed hand grinder

HIGHEST FULL-LOAD SPEED AVAILABLE

Ideal for carbide burrs, mounted wheels.

Balanced Power
—lower no-load speed for longer bearing life . . . higher full-load speed for maximum production, faster metal removal.

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No-load speed . . . 35,000 rpm
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Collets . . . ¼" and ⅛"
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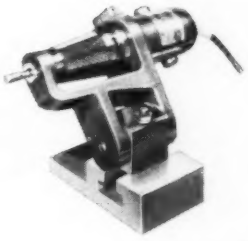

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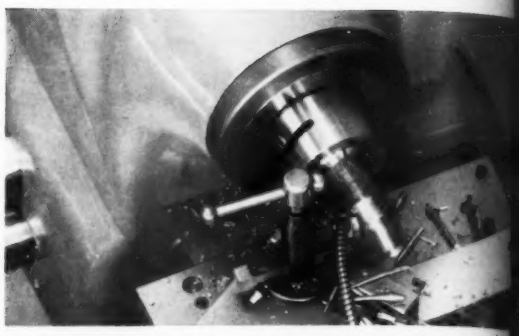
ELMIRA, N.Y.

"The Outstanding Tool Room Lathe"



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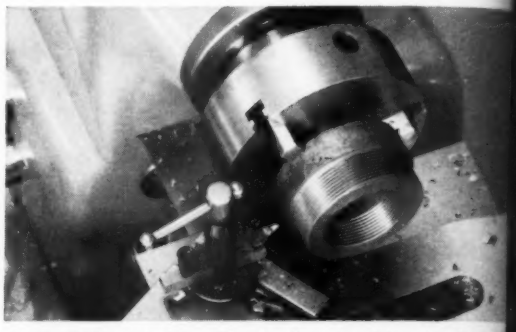
Precision Step Chucks for diameters up to 6". Provides Collet-like accuracy.



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Extreme accuracy, high spindle speeds, and thread cutting ability are coupled with power and ease of operation to obtain the desired results rapidly.

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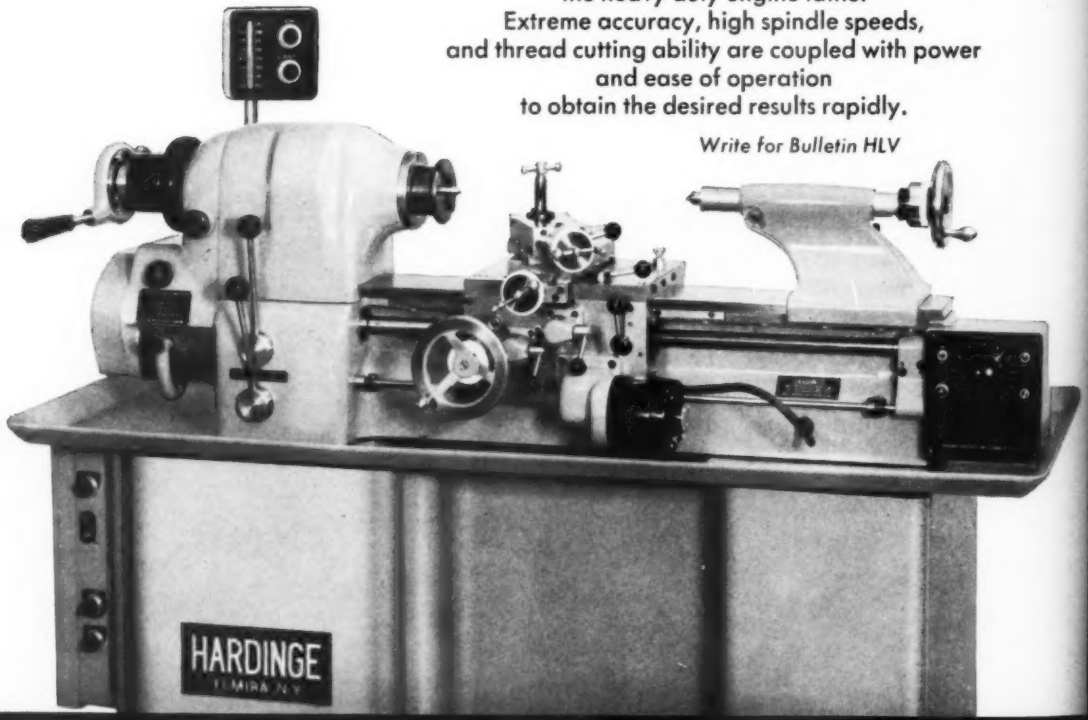

HARDINGE BROTHERS, INC., ELMIRA, N. Y

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